TECHNICAL
SUPPLEMENTAL
DATA

The Vintage Radio Identification SKETCH-BOOKS of D. H. MOORE

DRAFT ONLY

VOLUME IX

The Editorial Group, Ltd...

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DEDICATION

...to a way of life -
that should not have
been forgotten.

Autographed Edition

It is my sincerest wish that this latest contribution of my vintage radio writings may afford you as much enjoyment and usefulness as I've had in compiling it.

Over to you, and 73,

Palo Alto

Acknowledgements

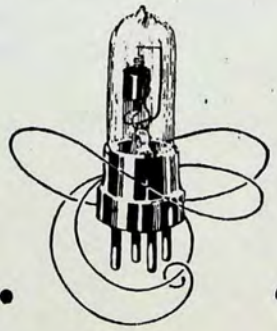
Bits and pieces of the material contained in these volumes have been published, referenced, or reviewed in divers media over the years, and where a prior copyright existed, my thanks to the publishers for relinquishment, especially foreign publishers. They all seem to have understood and shared in the inherent fraternalism of a labour of love, which is appreciated.

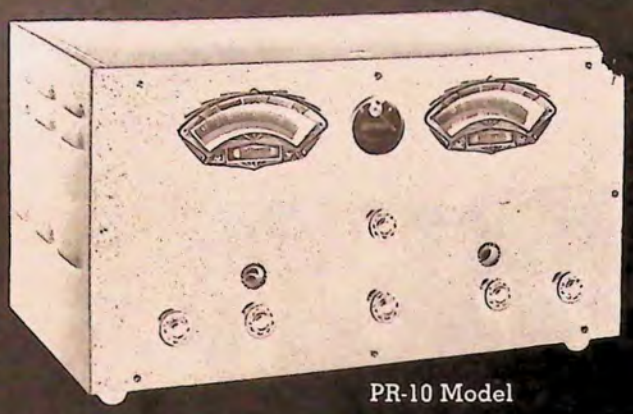
Thanks should also be given Stan Lopes of Concord, California, who patiently gave all original volumes a deft technical-edit of the authenticity of the circuits depicted. His efforts obviously have resulted in more useful books. He even found errors in original sources!

Thanks are also due to Charlie Rhodes of South Salem, New York, for his spotting a few fundamental errors in Volume VIII, which deals with the period of 1910 through 1924 - a period that actually holds little interest for me, but which apparently does for others, and that volume was created for them. Charlie's familiarity with circuitry of the period was a boon to the over-all effort.

Special thanks must go to D.G.Yule of Mountain View, California, who sponsored the original effort as a contribution to the hobby, and to Howard W. Granoff of Silver Spring, Maryland, whose unflagging effots to promote awareness of the Sketch-Books and Monographs has done much towards their current popularity and general acceptance.

And in as much as fraternalism is the basis for any shared special enthusiasm, which is what any hobby is, these Sketch-Books and Monographs in that traditional spirit.





PR-10 Model

PR-10 Chassis

Everything from A to Z

A—"B" on and off, Beat Oscillator switch.
B—Push, Tone Control. Normal, Band Spread.
C—Volume Control, Power Switch.
D—Push, Band Change. Normal, Main Tuning.
E—Short-Wave Trimmer, two gang.
F—Band Indicator.
G—Heavy 18-gauge Chromium Plated Chassis.
H—First Detector—#57.
I—First I. F. Tube—#58.
J—B. C. and 75 Meter Oscillator.
K—Second I. F. Tube—#58.
L—Three Stages I. F.
M—Third I. F. Tube—#38.
N—High Frequency Oscillator Tube—#56.
O—Beat Oscillator Control.
P—Second Detector and AVC Tube—#55.
Q—Beat Oscillator Tube—#57.
R—Vacuum Tube Volt Meter—#57.
S—Output Tube—#59.
T—Heavy Duty Power Supply.
U—Moisture-proof Filter.
V—Rectifier Tube—5Z3.
W—Patterson Velvet Tuning Dials.
X—Manual Control Mounts Here.
Y—Sensitivity, "R" Meter Adjustments.
Z—Three-gang Condenser, Rubber Mounted.

To Bandspread Amateur Bands Set Main Tuning Dial As Shown

Operation of the PR-10

Band	Main Dial	Switch Location
20 Meter Fone	46.5 or 51.5	15—33 Meters
20 Meter Total	46 or 51	15—33 Meters
40 Meter C. W.	28	30—75 Meters
75 Meter Fone	92	30—75 Meters
75 Meter Total	7	75—200 Meters
160 Meter Total	Use Main Tuning Dial	75—200 Meters

Broadcast—Set band spread dial at 0 and use main tuning dial.
Trimmer is not connected when switch is set for broadcast.

GENERAL INFORMATION

To locate the various Amateur bands, use the above scale. In all cases the band spread dial starts with 10 as the minimum. The trimmer condenser should always be used at the minimum resonant point. This assures tracking over the complete range of the main tuning dial.

The best type of antenna is a heavy wire as long and as high as possible. We have used 800 feet to good advantage. A small antenna will give you just as good results on loud stations but it will not receive extremely weak ones.

If more power is wanted from the beat oscillator, this can be had by adding a .1 mfd. condenser across the .006 mfd. condenser on the oscillator tube. We do not advise this change as it will cover up extremely weak stations.

The condenser gang is accurately trimmed and should not be touched under any conditions. The line-up is as follows: The section nearest the dial is the oscillator gang. The middle section tunes the first detector input. The rear section tunes the antenna coil. The trimmer on the antenna gang can be varied slightly to compensate for the different lengths of antenna.

To obtain the best possible results from the PR-10 requires a complete understanding of the receiver.

When the set is first put in operation be sure the speaker is plugged into the socket in the rear of the chassis before the power switch is turned on.

For a baffle board use either a box about 15 inches square made of 1-inch lumber, or next best, a large heavy board at least 3 feet square. Some amateurs mount the speaker in the wall; this is ideal.

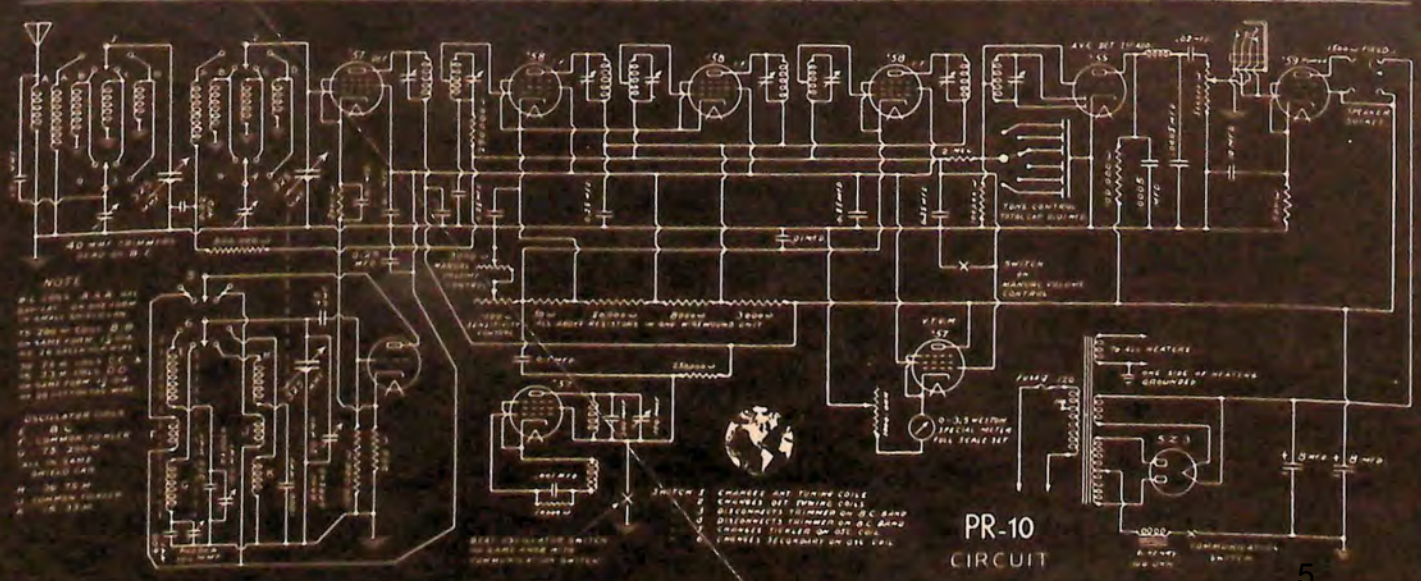
We do not advise using a doublet antenna but if the owner wants to experiment with one, hook it to the antenna and ground posts. Try tuning the feeders by using a condenser of about 300 M.M.F. in series with each lead. The best results are obtained when an extremely long antenna is used. The PR-10 is being operated by owners with 200 to 800 feet of aerial. Keeping the antenna in the clear is the most important part.

SETTING

To set the sensitivity and meter controls on the inside of the cabinet properly, turn the main tuning dial to "O" on the 15-33 meter, disconnect the antenna, and turn the sensitivity control until the tube hiss is about R-5 by ear volume; then adjust the meter control until the hand of the meter is in the set position. If this is done properly, the meter will read the correct R strength of carrier input to the antenna. Each band uses a separate coil changed by a six pole switch. The two coils on the top of the chassis are the band pass antenna coils for the 15-33 and 30-75 meter bands. The efficiency of these coils is kept high by not shielding them. The Broadcast antenna coil is in the small shield behind the condenser. The 75-200 meter coil is under the chassis below the two low wave coils.

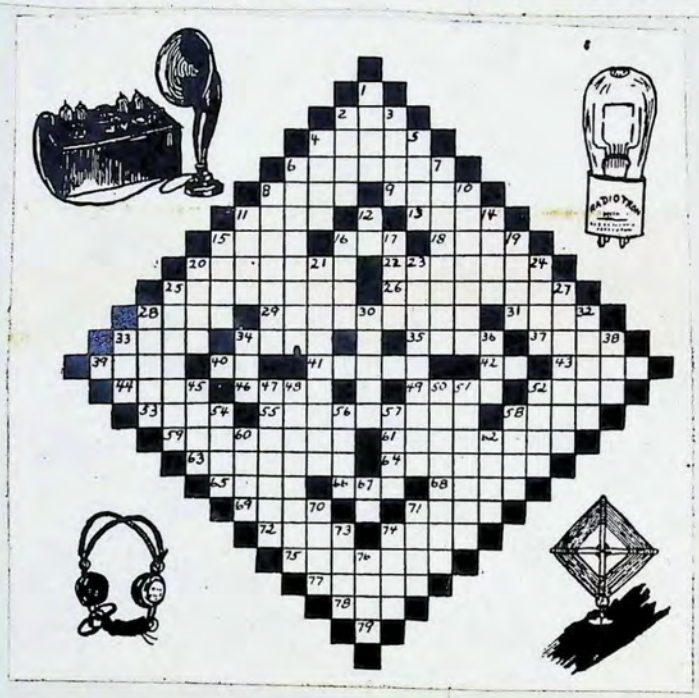
The PR-10 does not use a crystal filter circuit owing to the fact that this set uses three stages of I.F. and the selectivity is somewhat in excess of the average two stage I.F. receiver when using crystal.

The PR-10 cuts side bands on voice reception at 1200 cycles off resonance and it is possible to single signal a code signal by offsetting the Beat Oscillator. A number of skeptical amateurs have tried to better code reception by introducing a crystal in



PR-10 CIRCUIT

Cross-Word



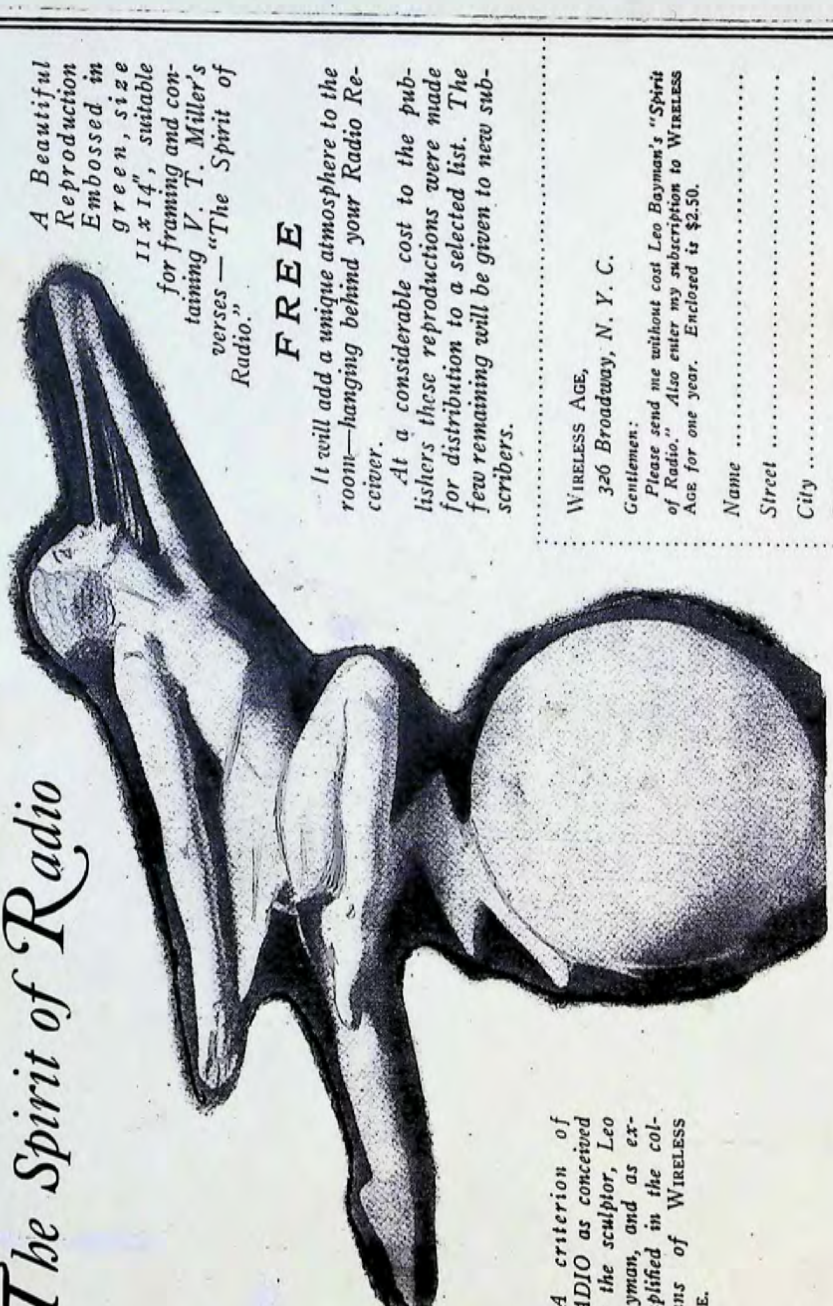
HORIZONTAL.

2—Insect
4—European blackbird
6—Existing in name only
8—Japanese coin (Pl.)
9—The twelve Gods
11—Upright
13—Prepare for publication
15—Saucy
16—To cut with an axe
18—Girl's name
20—Introduction to a book
22—Hackney-coaches (Fr.)
25—One who tells
26—Aerials
28—Left side of a ship
29—Collector of electrical energy
31—Excavates
33—Alike
34—Possessive pronoun
35—Employs
37—Stupefying drug
39—Facts granted
40—Belonging to
41—Completeness
42—Printer's measure
43—Acid taste
44—Surrender
46—Da Dit Da Dit; Dit Dit Dit; Da Da Da; Dit Da Dit
49—Extent
52—Pigments used in painting
53—Dress (Pl.)
55—An American swan
58—Lead wire inserted in circuit
59—Total impedance in circuit
61—Absurdity
63—Toothed
64—First circuit
65—Judicial sentence of condemnation
66—Attempt
68—Attendant (Fr.)
69—Private school (Colloq. abbr.)
71—Prefix meaning before
72—Frozen vapor
74—Cut into cubes
75—Shaving the crown of the head
77—Susidiary electric circuit
78—Nothing
79—Code for Paid Radio Message

VERTICAL.

1—South American republic
2—Lays a wager
3—Girl's name
4—Place where money is coined
5—Facility
6—One who makes a will
7—Sends out ether waves
8—Upper face
10—Genuine; honest
11—Ridicule
12—Exist
14—Aquatic bird
15—Dit Da Da Dit; Dit Da Dit; Dit Da Dit; Da
16—Collection of cattle
17—Broadcasting station in Alabama
19—Iranian language of ancient Persia
20—Cut away
21—To put together radio parts
23—Non-conductor of electricity
24—Uttered
25—Wandering; pastoral
27—Self-exaltation
28—Father (Latin)
30—Bar
32—Short interval
33—Ancient privilege to hold court
34—High Frequency Current
36—Body of water
38—Sooner than
45—Exclamation of wonder (Obs.)
47—Part of motor at rest (Pl.)
48—Embellishment
50—Confidence
51—Religious recluse
52—Earnestly employed
54—Moved quickly
56—Encounter
57—See unexpectedly
58—Evolved by ignition
60—Da; Da Dit; Da Da Da; Dit Da Da Dit
62—Barrel or cask
67—Reply prepaid radiograms (Code)
70—Without means
71—Breezy; gay
73—Dit Da Da; Da Dit; Dit; Da Dit
74—Composed of two
76—Glide or slide

The Spirit of Radio



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* * *
* *
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This ninth and final volume of my RADIO IDENTIFICATION SKETCH-BOOKS came into being at the suggestion of Howard W. Granoff, of Olde Tyme Radio Company, and if you find it interesting, and useful, you can thank Howard.

While the following pages depict a miscellania of information referenced to specific prior volumes of the Sketch-Books, they may be read as things in themselves, as each depictation is complete in itself, from which the unit may be readily identified, or, hopefully, move you to have a go at actually constucting the unit, as it remains a fact that the fun of vintage radio is in doing it yourself.

If you are unfamiliar with the other eight volumes which comprise this series, this volume will give you a very good idea for what the other volumes are like, and could conjure an interest which I personally feel will be rewarding to you, personally, and the hobby in general.

Actually, it was the obvious ingenuity and sense of high adventure revealed in the early hardware and accessories that became the corner-stone of my enduring interest in vintage radio. It was in the searching for such items that lead to the creation of the series of books listed on the back cover of this one.

Sketch-books have, of course, historically and traditionally always been infrapersonal expressions of the compiler. My books are not departures from that tradition, and that others in the hobby of vintage radio have found my labours of interest and value pleases me, naturally, and has justified the effort. As any hobby fundamentally is a *shared* enthusiasm, I am happy to share with you this work.

As with all of the other volumes in this series, comments and suggestion will always be welcomed, by me or Howard W. Granoff's operation in Silver Spring, whose address is on the inside back cover. While this book is part of the revised and enlarged pre-publication edition, a further edition could come into being, based on your comments and suggestions.

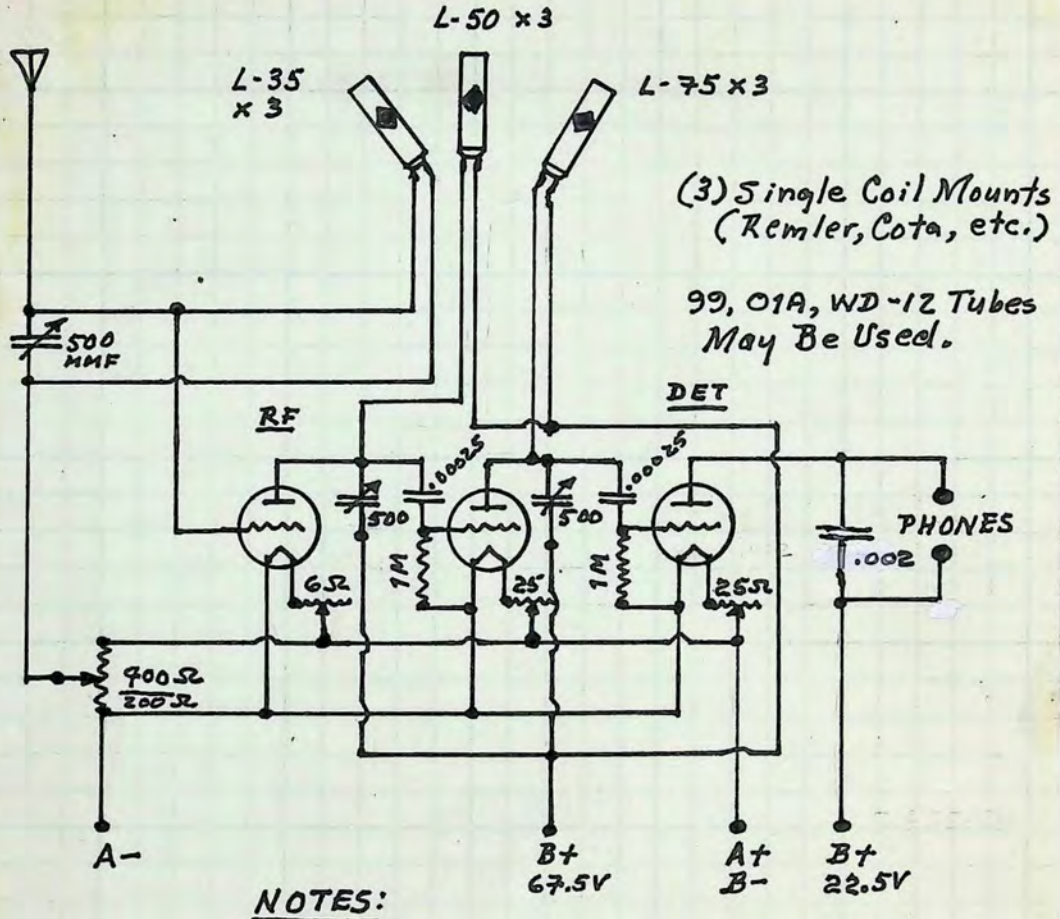
Over to you, and 73,

D.H.MOORE

Palo Alto, 1986

A THREE COIL REGENERATIVE RECEIVER, 1922

NOTE: A three-coil reference is not the same as a triple-coil ref.

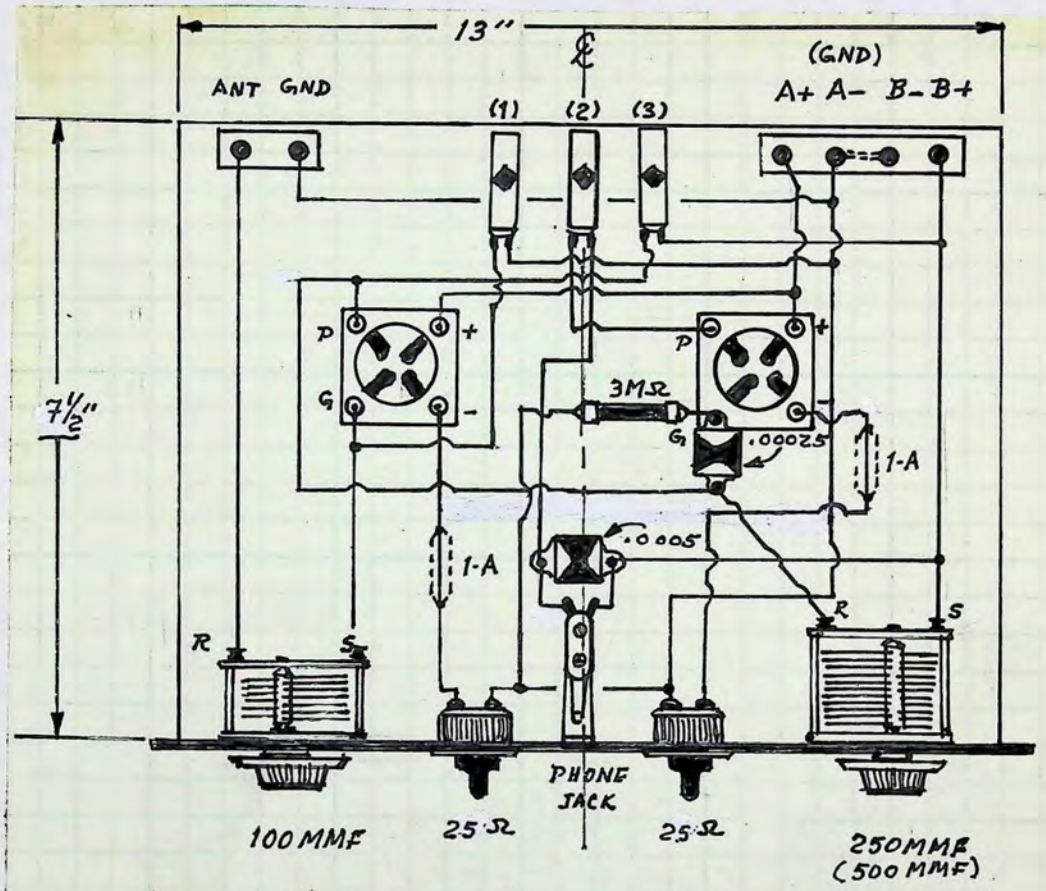


NOTES:

(2) Rheostats @ 25Ω. (1) Rheostat @ 6Ω.
Potentiometer 400Ω/200Ω.
All Coils of Like Turns Used Together!
A 2-Stage AF Amplifier May Be Added.
Coils Must NOT Be Placed In Inductive Relation To One Another.
Aerial = 80' ~ 100'.
Panel = 7" x 14".
Original Cost of Parts = $46.95 (Gold Std.).
This Was An Early Impedance-Coupled T.R.F. Receiver, 1922, & Is Worth Constructing.

(RD)

TRIPLE-COIL REGENERATIVE, 1923; Sht. 1



(Simplified Layout Designed By D.H.Moore.)

NOTES

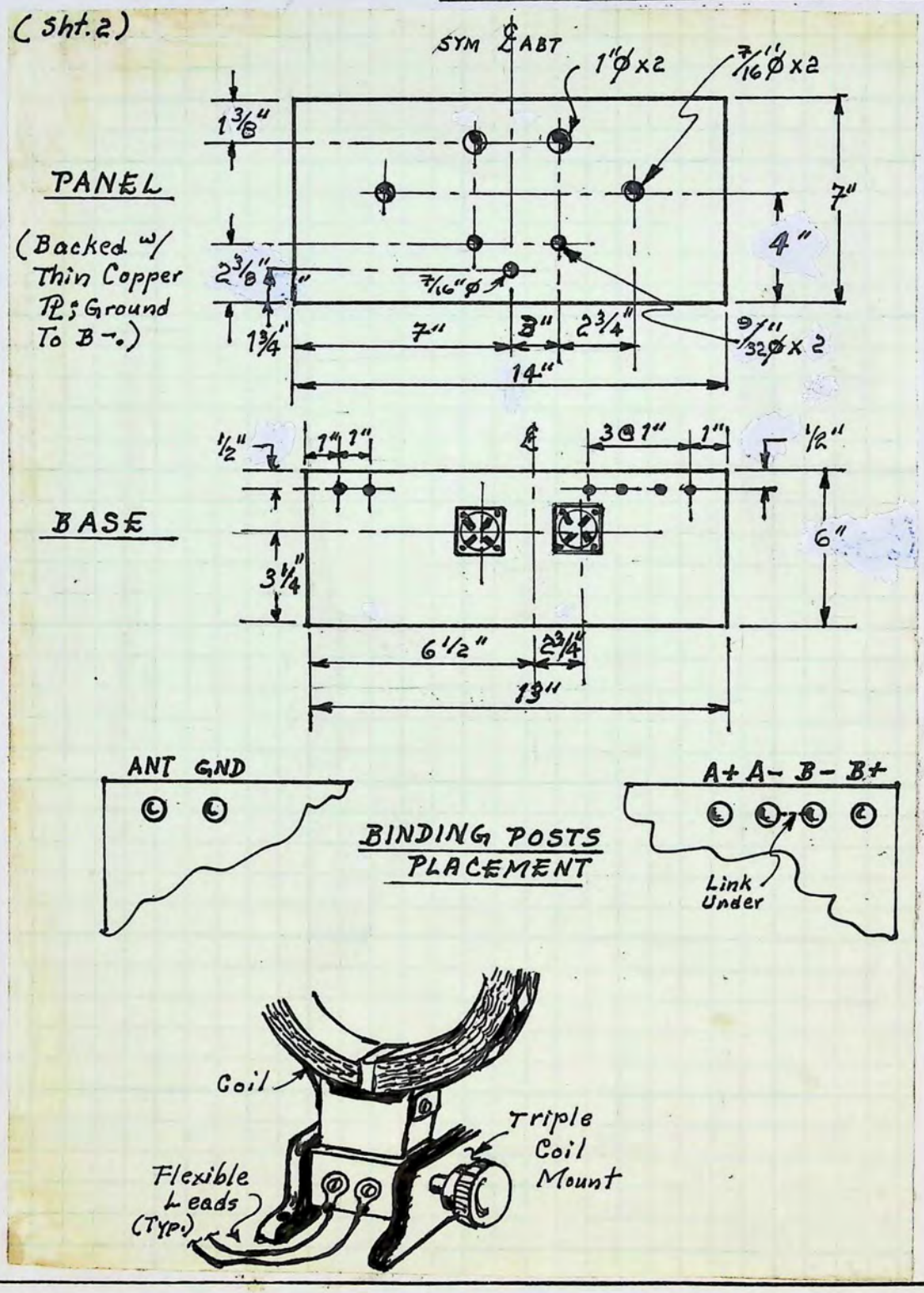
1. 50T Coils Will Cover Lower BC Range Only; To Cover Upper Range Insert A 75T Coil In The Centre Mount. To Cover The Full BC Range, Use 75T Coil & A 500MMF Variable Condenser.

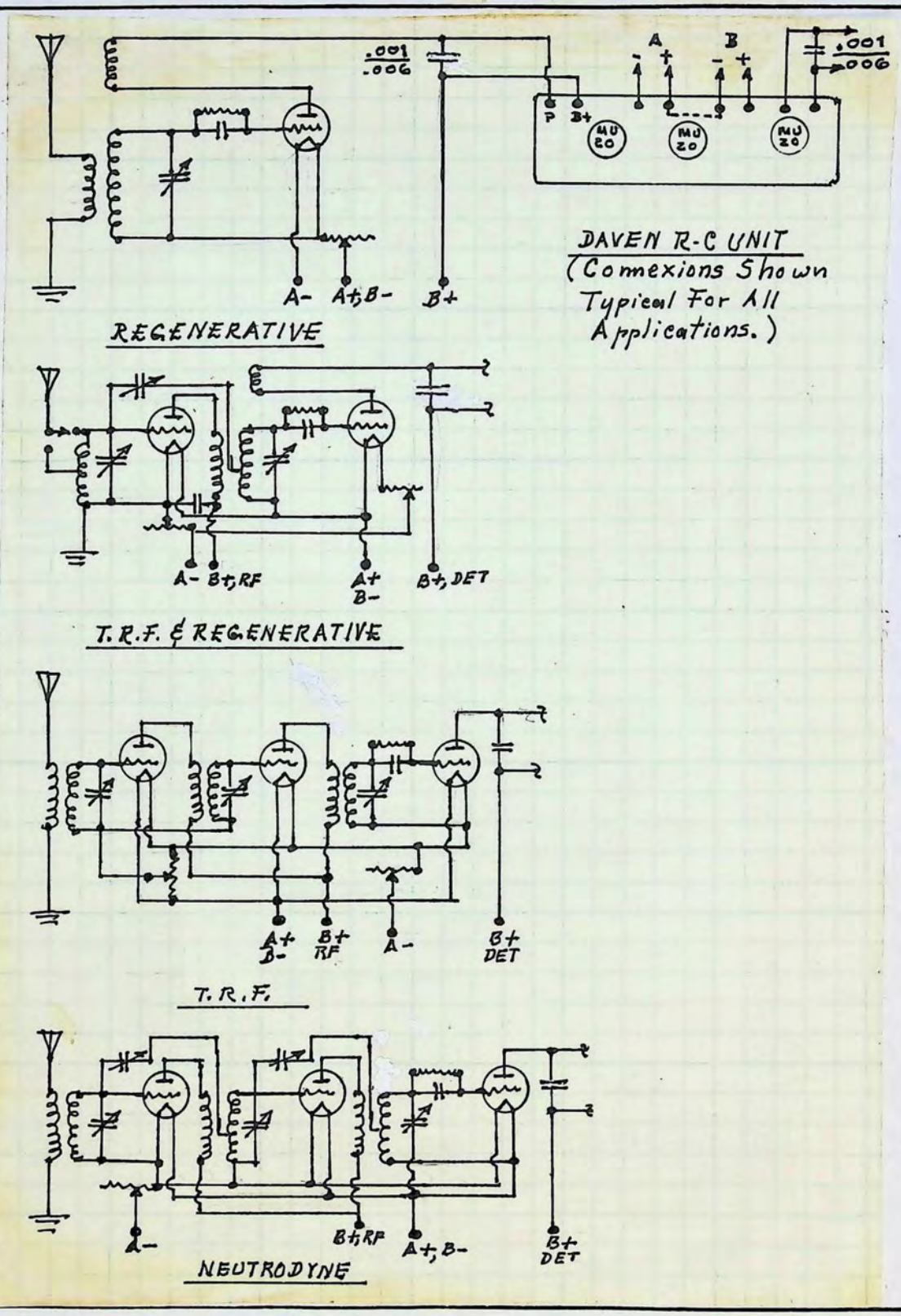
2. Various Grid-Leaks Should Be Tried.

3. Both Tubes Are Regenerative, & Coils Should Be Rather Widely Seperated.

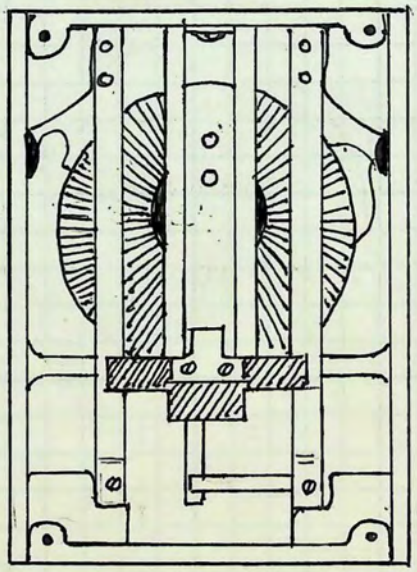
4. Stability Has Been Found Best @ 67V B+: Do Not Put 90V On An 01A TL!

TRIPLE COIL REGENERATIVE, 1923; Sht. 2



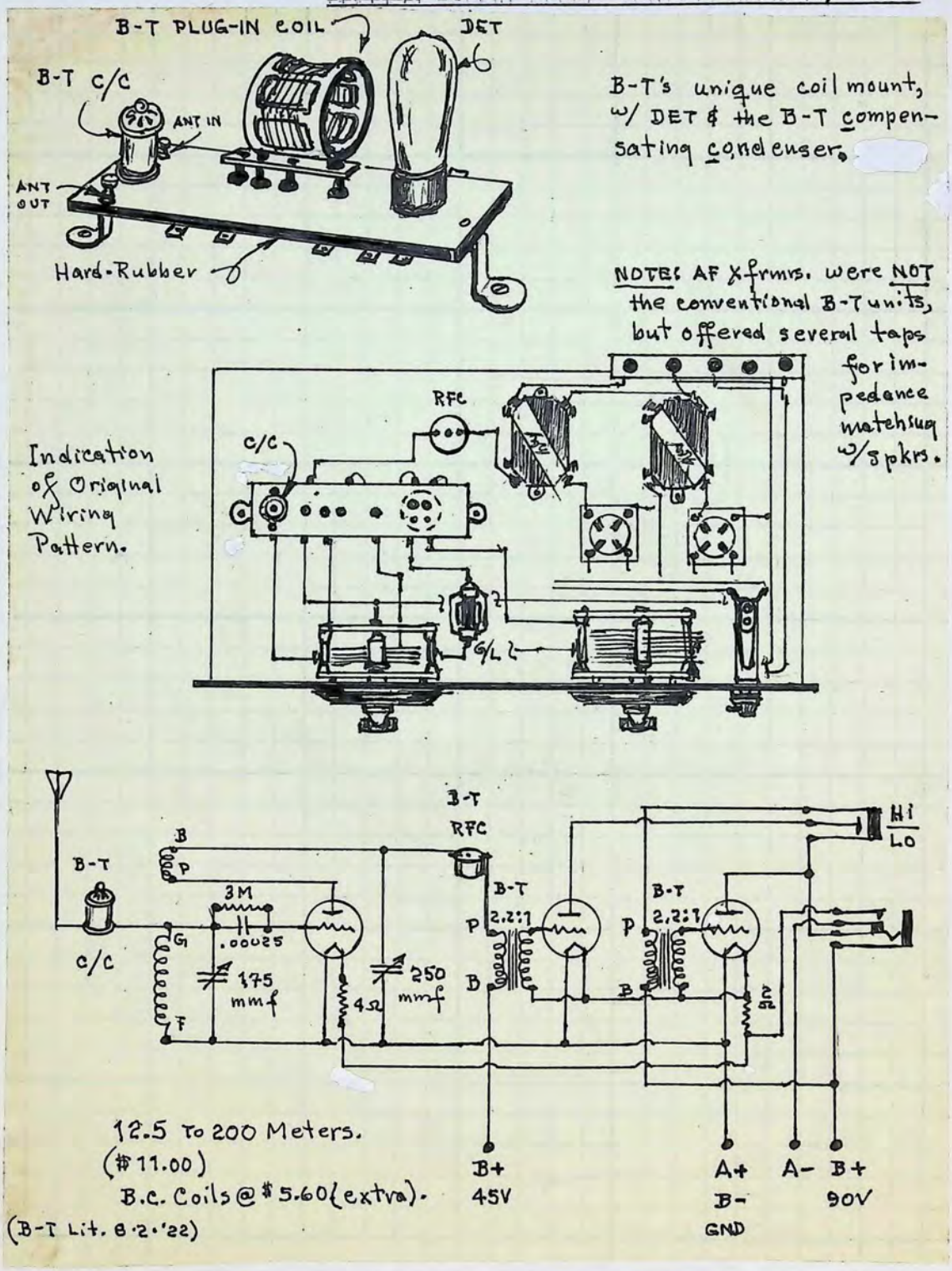

.001
.006
A
B
P
B+
MU 20
MU 20
MU 20
.001
.006
DAVEN R-C UNIT
(Connexions Shown Typical For All Applications.)
A-
A+, B-
B+
REGENERATIVE
A-
B+, RF
A+
B-
B+, DET
T.R.F. & REGENERATIVE
A+
B-
B+
RF
A-
B+
DET
T.R.F.
A-
B+, RF
A+, B-
B+
DET
NEUTRODYNE

JEWELL TYPE 595 A-B RELAY DETAILS, 1924



COVER REMOVED

BREMER-TULLY SHORT-WAVE RECEIVER, 1922



AN EFFICIENT 5 TUBE RECEIVER

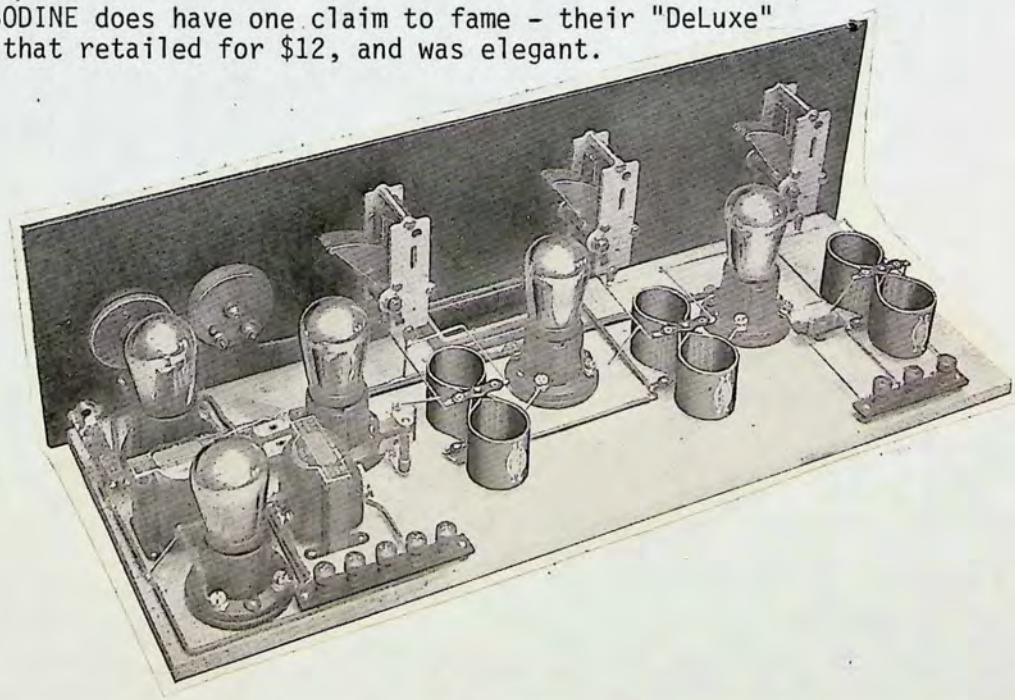
BODINE TWIN-EIGHT

It would appear that, sooner or later, manufacturers of components had a go at offering the home-constructor a "new" circuit, using the manufacturer's parts, naturally. Among such would be Acme, Caldwell, Elkay, Camfield, Lynch. There was not much difference between the circuits offered, except for the coils specified; and in performance, there was practically no difference.

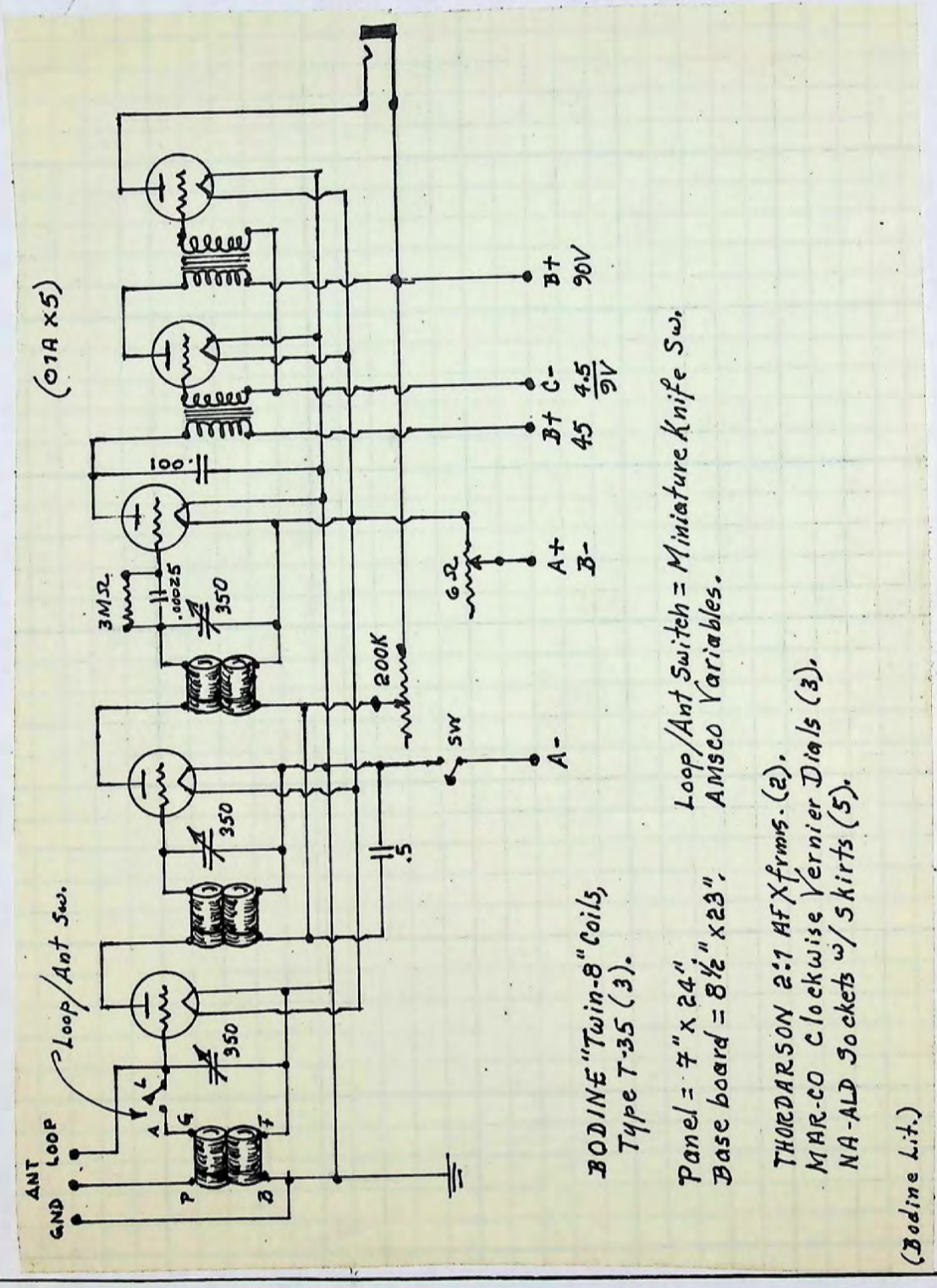
The 1926 BODINE "Twin-8" TRF is a typical example of such. It is a straight-forward TRF, simple to construct and satisfactory in performance. The BODINE coils, called binocular coils by others, were efficient, allowing you to bring in 575 meters at a setting of 97 on the first dial. This takes on significance when you remember that one usually had to start with a setting of 10 or 15 divisions on the dial, which meant that on a 0 to 100 division dial, you had 20 to 30 divisions of nothing.

The schematic shown over-leaf may also be used to experiement with other binocular-type coils, changing only the coils. The differences will be subtle, but they can be detected, and there is no substitute for factual knowledge gained from your own experience.

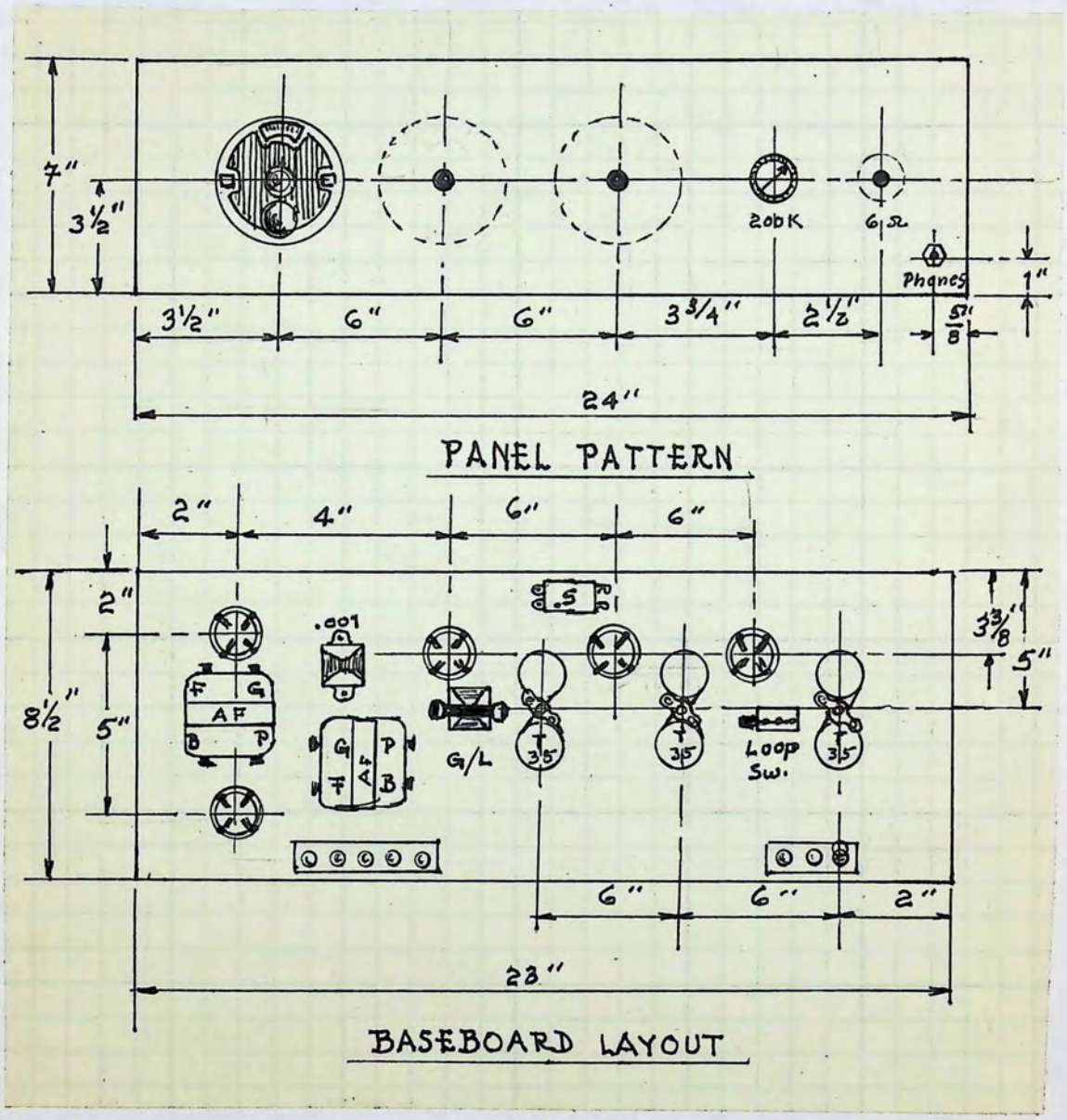
BODINE does have one claim to fame - their "DeLuxe" loop, that retailed for $12, and was elegant.

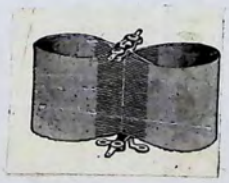


BODINE "TWIN-8" TRF, 1926: Sht. 2

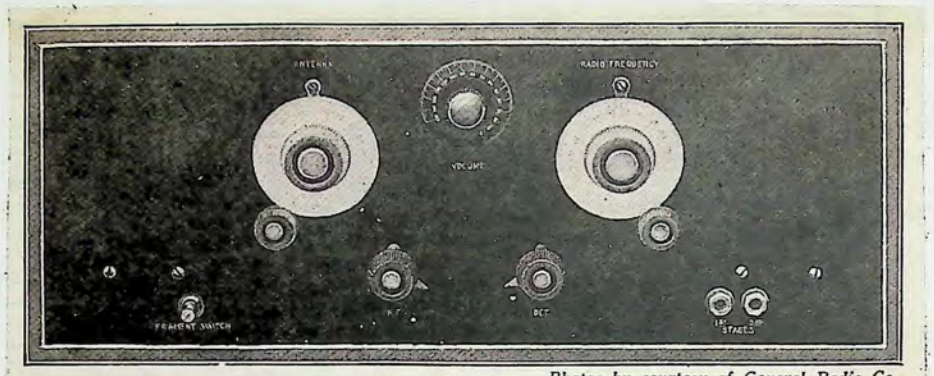


BODINE "TWIN-8" TRF, 1926: Sheet 3

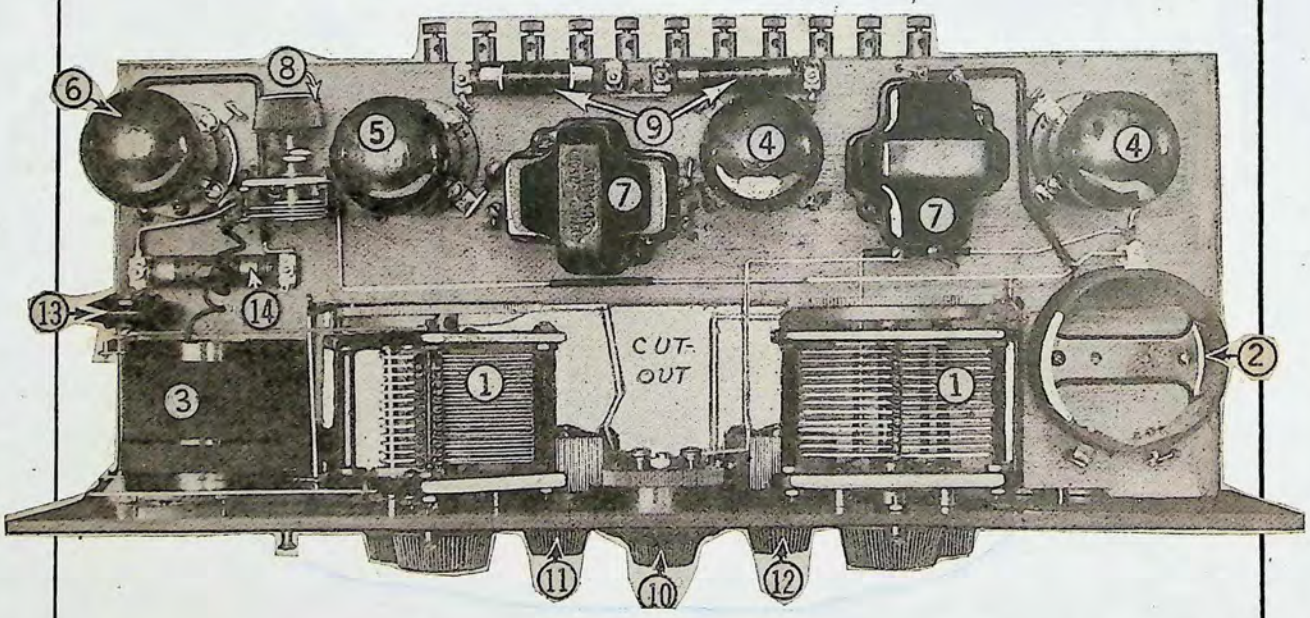




GENERAL RADIO BALANCED TRF, 1926: Sht. 1

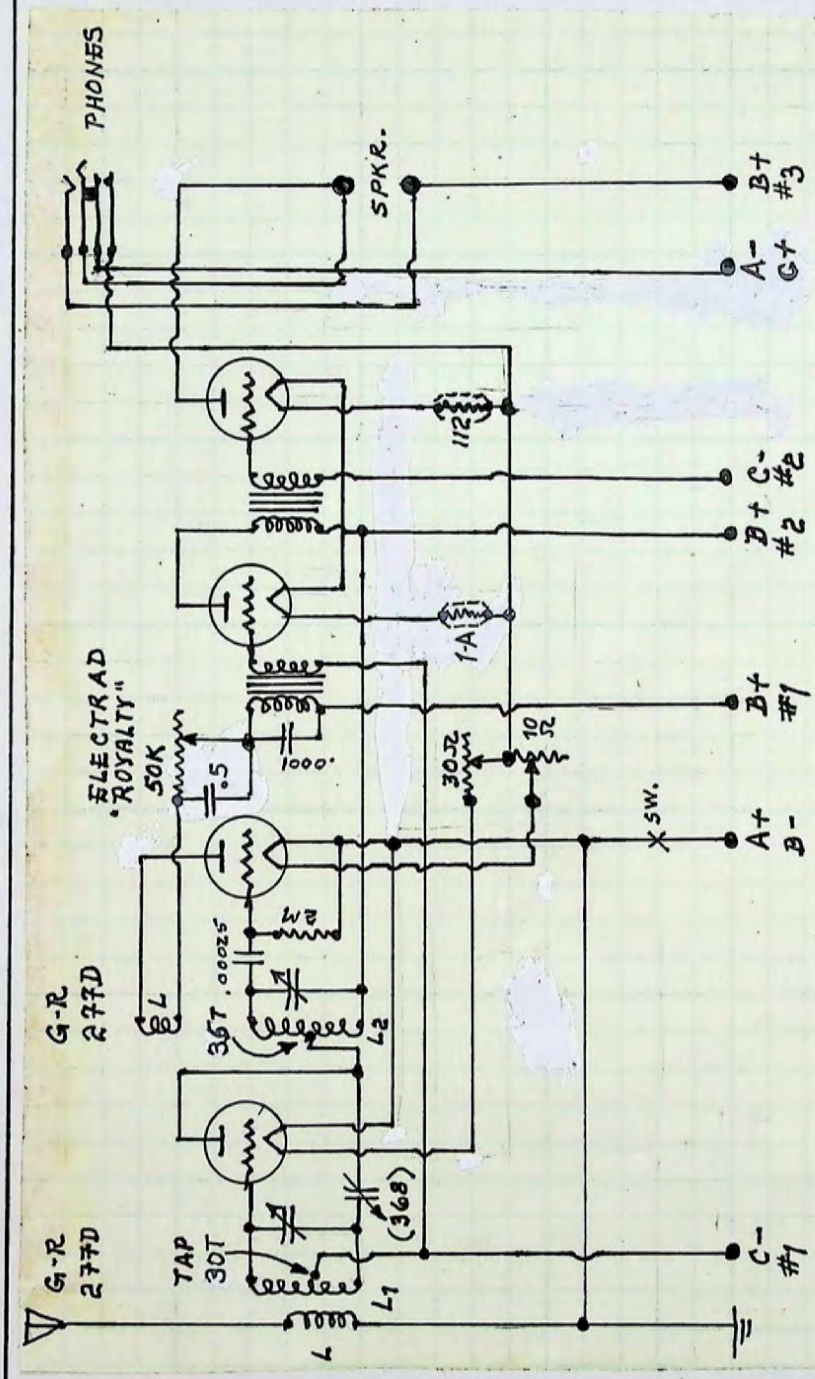


Photos by courtesy of General Radio Co.



1. Variable Condenser.
2. RF Transformer.
3. ANT Coupler.
4. AF Amplifier Tube.
5. DET Tube.
6. RF Tube.
7. AF Transformers.
8. Midget Variable (5 Plates).
9. Amperites.
10. 50K Rheostat.
11. FIL Rheostat.
12. FIL Rheostat.
13. Grid Condenser.
14. Grid-Leak.

GENERAL RADIO BALANCED TRF, 1926: Sht. 2

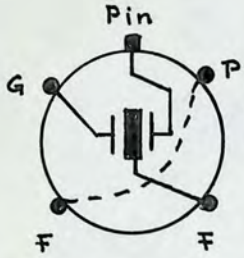


PANEL = 7" x 18".
BASE B'D. = 7" x 17" x ½".
CUTOUT = 3" x 11".
G-R VARIABLES 247H.
AF XFRMR. 285 (6:1).
AF XFRMR. 285L (2:1).
RHEOSTATS 301.
SOCKETS 349 (4).

COIL DATA: (If you wind your own.)
Form = 2¾" ø x 2½".
L = 15T, #24 DCC.
L_1 = 59T, #24 DCC, TAPT @ 30T.
L_2 = 59T, #24 DCC, TAPT @ 35T.

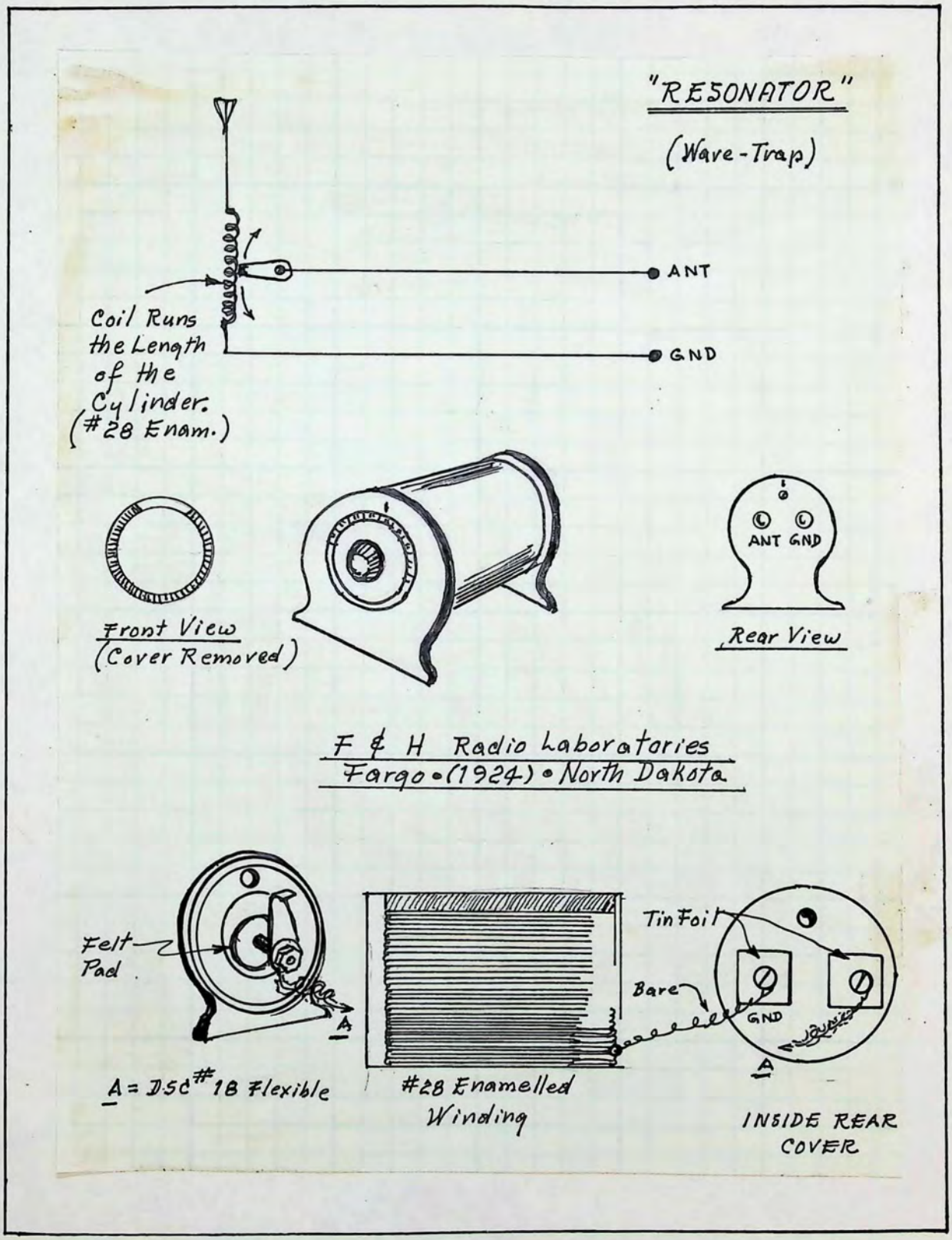
G-R Micro-Condenser 368.
Terminal Strip = 1¾" x 9¾" x 3/16".

RAYTHEON "R" TUBE
(A Cautionary Note)

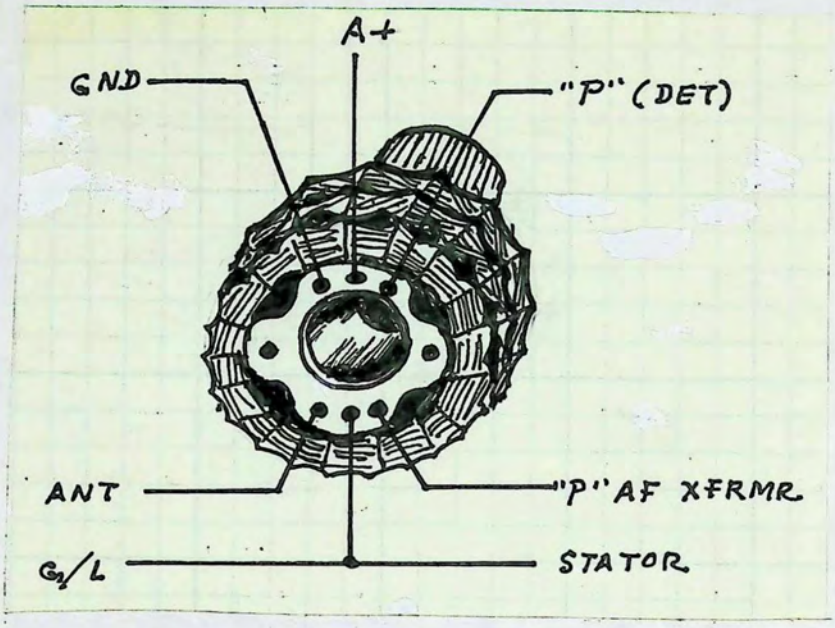


The employment of what were called "glow-tubes" in early B-eliminators was quite popular for several years. Its purpose was to function as a voltage stabilizer in the B+90V line. The Raytheon "R" tube was an advance over the more conventional 874 glow-tube, and was a bit more rugged in its constuction. However, it had a peculiar hook-up, as shown in the sketch at left, and required some thought in application, in as much as the tube could NOT be used with the average socket-power types.The "R" tube imposed an extra load on the rectifier and power chokes, and chokes capable of handling 86 mADC had to be selected, such as those made by National or Amer-Tran. The rectifier tube had to be of the 85 mA type, not the usual 65 mA type, and the power transformer had to have a double HV winding secondary with 300 volts across each side. You will note the odd connexion to one plate of the "R" tube in the sketch, going as shown through the orientation pin. This feature prevented it from becoming too popular, as the hook-up required was a bit too unconventional for the time. Also, the art of voltage stabilisation was advancing rather rapidly by 1929, and the need for such as the "R" tube was diminishing.

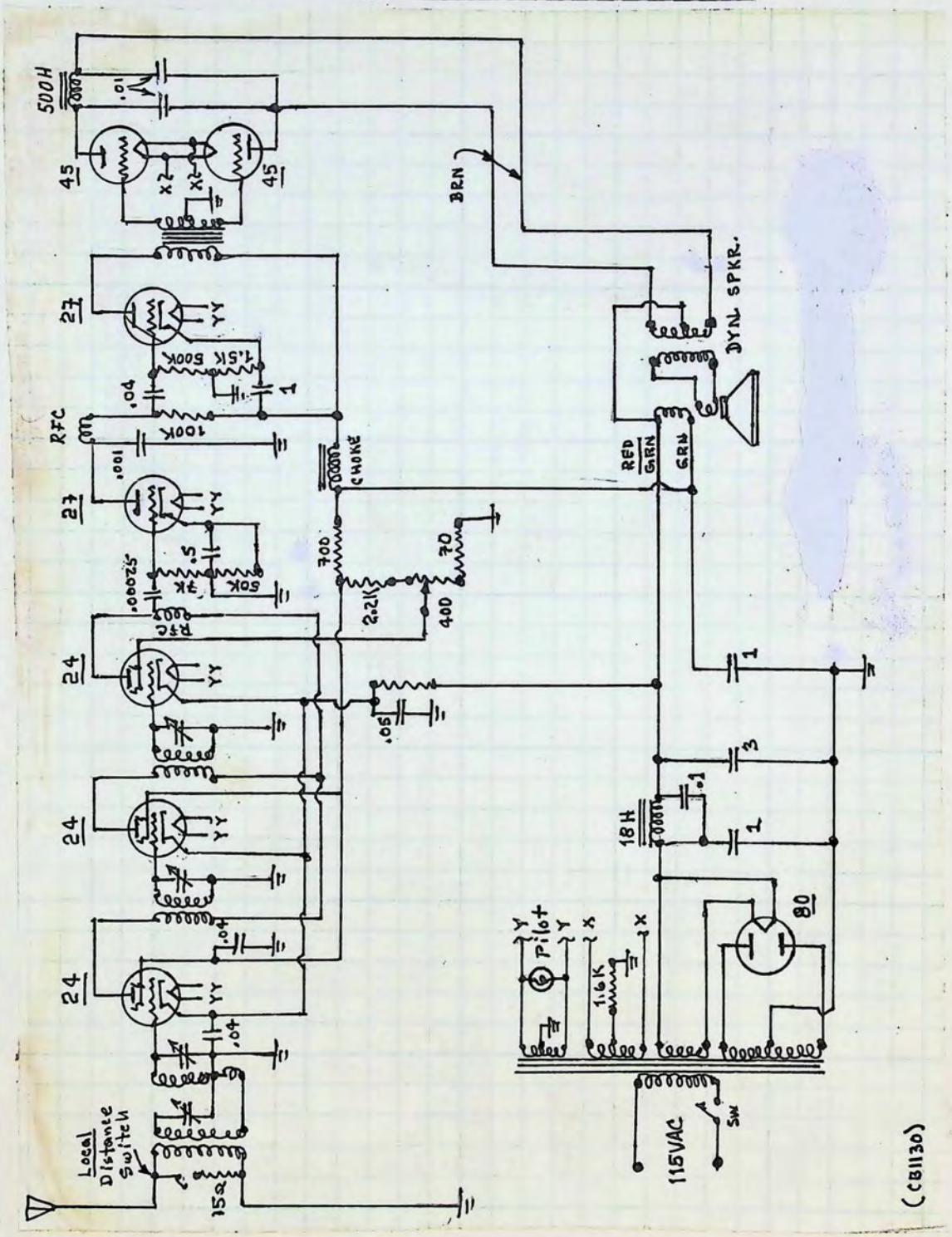
* * *


"RESONATOR"
(Wave-Trap)
ANT
GND
Coil Runs the Length of the Cylinder. (#28 Enam.)
Front View (Cover Removed)
ANT GND
Rear View
F & H Radio Laboratories
Fargo • (1924) • North Dakota
Felt Pad
A
A = D.S.C. #18 Flexible
#28 Enamelled Winding
Tin Foil
Bare
GND
A
INSIDE REAR COVER

"CLAROTUNER" MODEL TCH DETAIL



APEX SCREEN-GRID MODEL 48, 1929

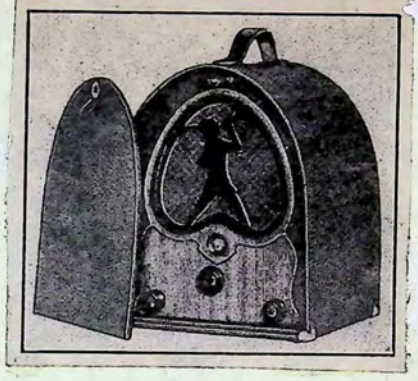


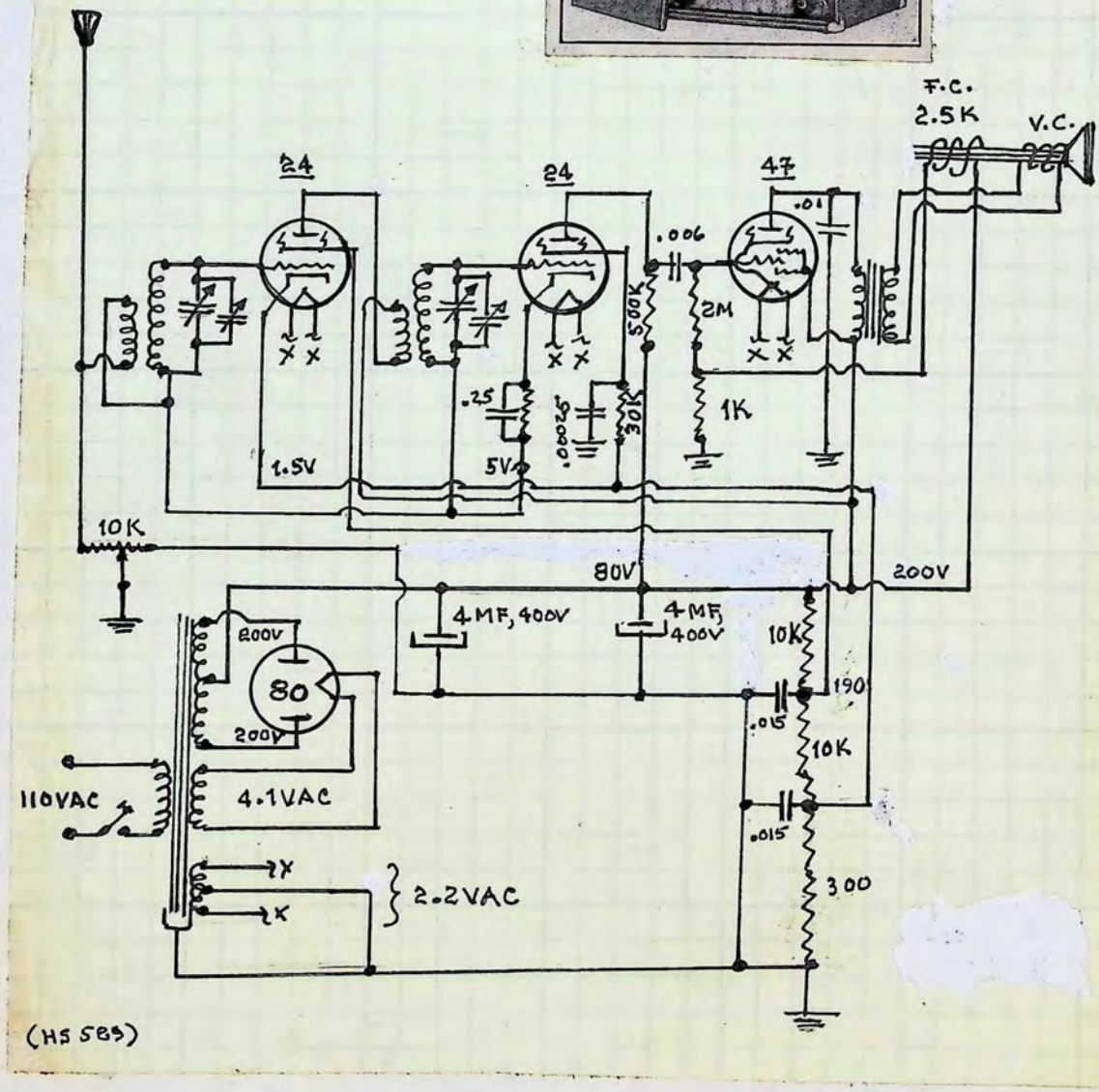
PACKARD-BELL, LTD.

WOULD OSCILLATE TO 700 KC.

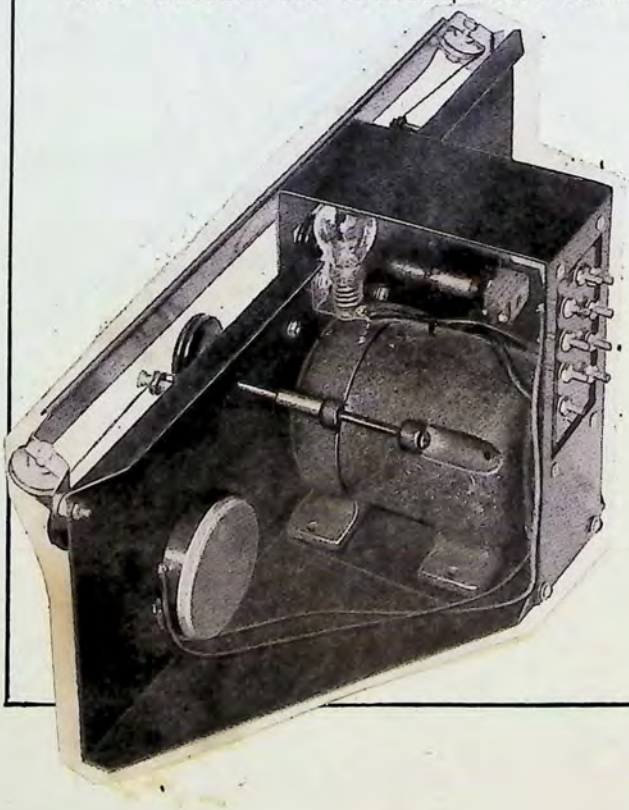
WEIGHT - 10 LBS.
HEIGHT - 12".

MODEL 84 PETER PAN MIDGET SET





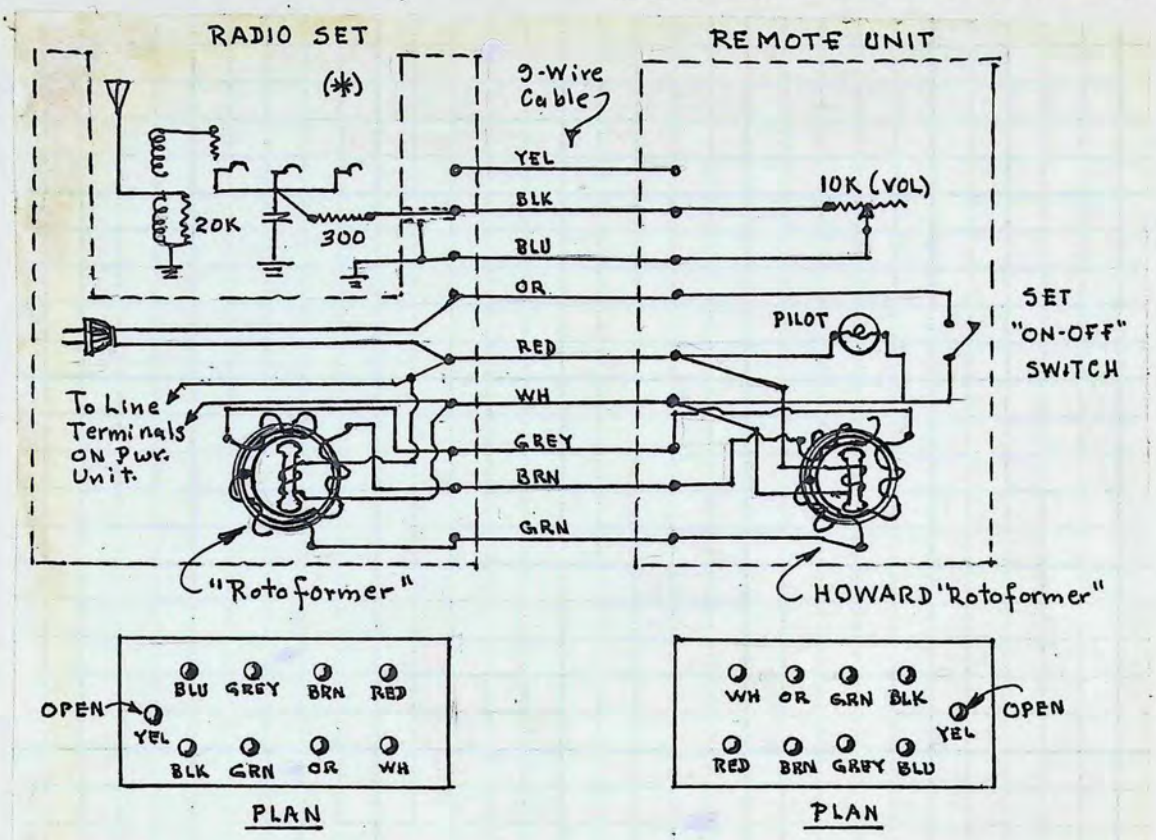
Remote control of radios was an early ambition of engineers, and by the late Twenties, several were offered the public, such as Howard, Scott, Philco. None were even moderately successful, but they do have a technical interest for vintage radio hobbyists. The Howard unit was the brain-child of A. Crossley, chief engineer for Howard. Its installation required the removal of the colume control, switch, and standard driving mechanism from a standard chassis, and the incorporation of a gear-driven chain-drive attached to a synchronous motor, which may be seen in the sketch depicted over-leaf. The unit was attached to the radio by means of a 9-wire cable, and also contained a locking device - to thwart careless knob-twisters and undisciplined children!



Howard Radio Company, like the Gilfillan Brothers of Los Angeles, manufactured radios for others, and it was Scott who forced Silver to admit publicly that his radios were manufactured by Howard's factory, a few blocks away from Silver-Marshall operations.

The remote control unit was well-made, quite ingenious, and never became a commercial success, which was also the fate of other attempts to a commercially feasible remote control unit. That had to wait for the wireless remote control of the Thirties.

HOWARD REMOTE CONTROL UNIT; 1929:Sht2



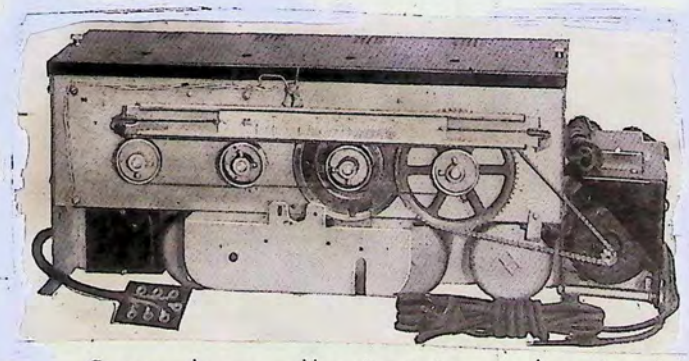
PLAN

PLAN

(*) = Changes on Chassis.

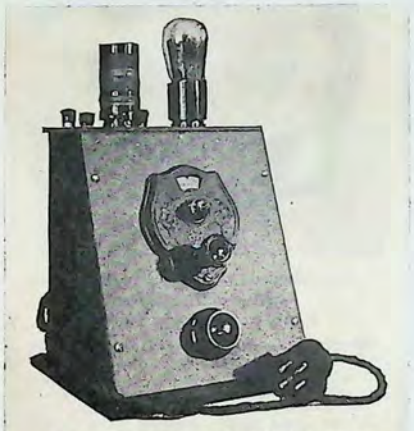
(CB1130)

May be utilized w/ other sets, other than HOWARD, w/ an adapter kit HOWARD supplied to servicemen.



Gear-drive attached to a standard HOWARD radio chassis.

SHORT WAVE ADAPTER



RECORP LOWAVER

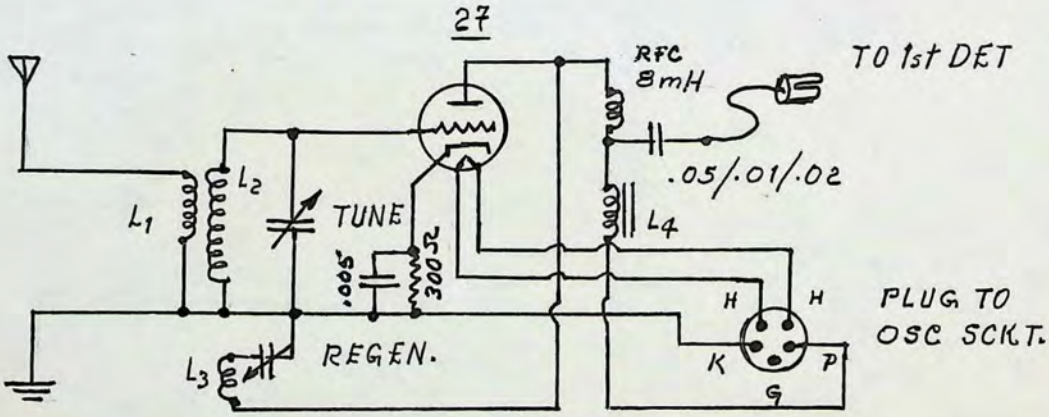
In 1928 the Richardson Electric Company of Ft. Lauderdale offered dealers the unit shown at left. It was offered in two models - one for DC operated sets, and one for AC, or what were called power-socket sets - which meant a B-eliminator.

The dealer's price for either was $13; the retail price was $25.

Essentially, the unit was a copy of the "Submariner" short-wave adapter, shown elsewhere in this volume, and in performance, was pretty much the same. Its one claim to fame was simply that it was cheaper than the "Submariner" unit, and was not as "pretty".

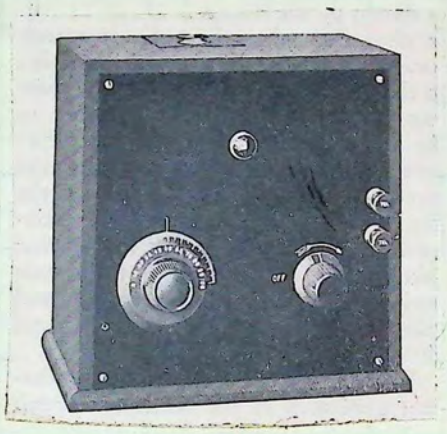
The unit was designed for use with any radio employing the 27 as the first detector. Any standard 3-winding coil with a fixed tickler could be used, with the "Octocoil" brand seeming to be the best, from my own tests.

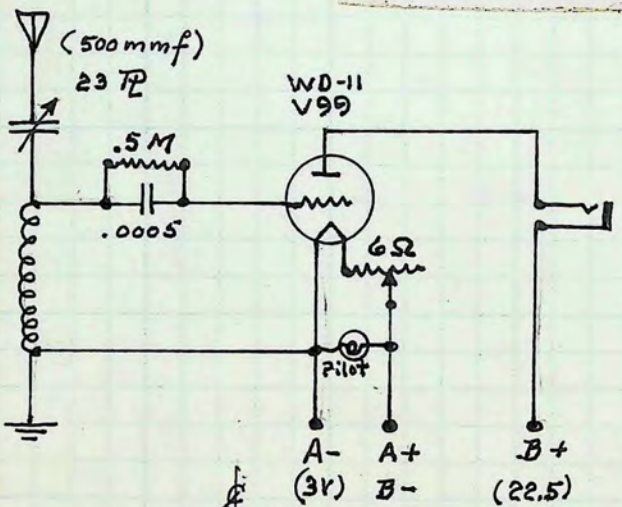
The knob shown at the bottom of the panel was the regeneration control; the AF choke was from 1 to 10 Henries.



1-TUBE NON-REGEN. SET
(1923)

Rheostat Mounted Inside Coil via Brass Channel.





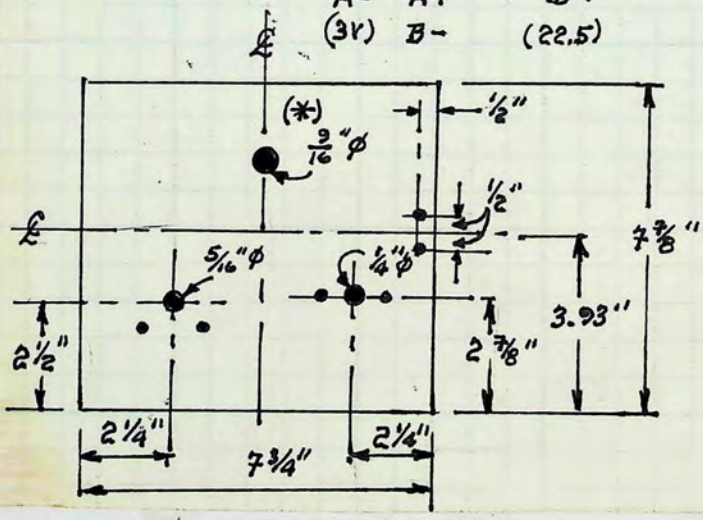
COIL DATA

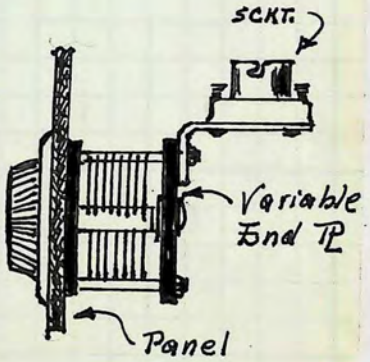
Form = 3"ϕ Fibre.

45 Turns, #28 Enamel Wire.

All Wiring = #14 Bare Cu.

(*) = Pilot Lamp Lens.





WARREN RADIO LOOP

Among the more novel and gimmicked offerings to the public by opportunists and media-dramatised trivia must be listed the Warren Loop. It was advertised in 1922 as:

"The Loop That Made The Radio Roller Chair Famous On The Asbury Park Boardwalk!"

The Warren Loop also appeared a bit later on the Boardwalk at Atlantic City, but at that time Asbury Park was the preferred watering place for everyman and his wife. Atlantic City did not catch the public's fancy until promotors began to stage what became known as "Beauty Contests", eclipsing Asbury Park's shills.

The Warren Loop was offered in two versions, directional and non-directional. The range was from 175 meters to 19,000 meters - with the aid of a honeycomb coil. Prices were from $10 to $25, and was touted as being the ideal loop for the then-emerging Armstrong regenerative circuits.

All of the loops were pancake-wound around an 18" square, and were supplied with a dust cover, shown above at right.

Americans have always been prone to stop and gawk at anything new or novel of out of the ordinary dullness of their lives, so it follows that many a visitor to Asbury Park or Atlantic City must have been fascinated by the Warren Loop on open-chassis radios seen on the wicker Roller Chairs being pushed along the boardwalk by coloured lads, to whom at that time a dime was a large tip.

The pen-and-ink sketch depicted above from a Warren advert was copied from an original photograph, and while the name of the commercial artist was not listed, he was very good, whoever he was, as sketches in pointed media have become a lost art among our self-proclaimed "artists" the nonce.

It is reasonable to assume that the sight of the Warren Loop moved many a citizen to look into this new thing called Radio.

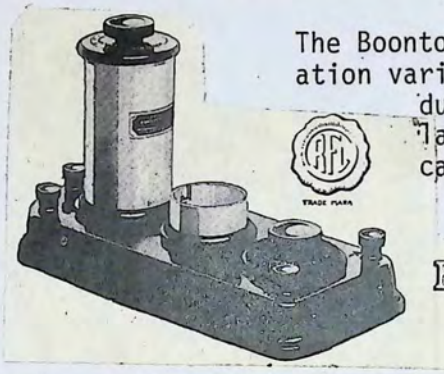
The "Radioceptor" crystal set of the Kansas City Radio Mfg. Company was a neatly packaged item, and sold for the surprising sum of $18, and $7.50 for a pair of Murdock phones. In 1922 crystal sets were offered for as low as $2.50, so K.C.'s price was exceptional. Basically, the unit was simply a rather large variometer mounted on a hard rubber panel, in a mahogany box. The engraving on the panel did show some artistic thought.

* * *

The "MARVEL" crystal set was offered by Freed-Eisemann early on, and if you detect a family relationship between the "Marvel" and the "Radioceptor" shown above, it was because Freed-Eisemann sold their interests to K.C. Radio. A close inspection of the "Marvel" cuts will show how K.C. Radio made the Freed-Eisemann unit "prettier", to its advantage.

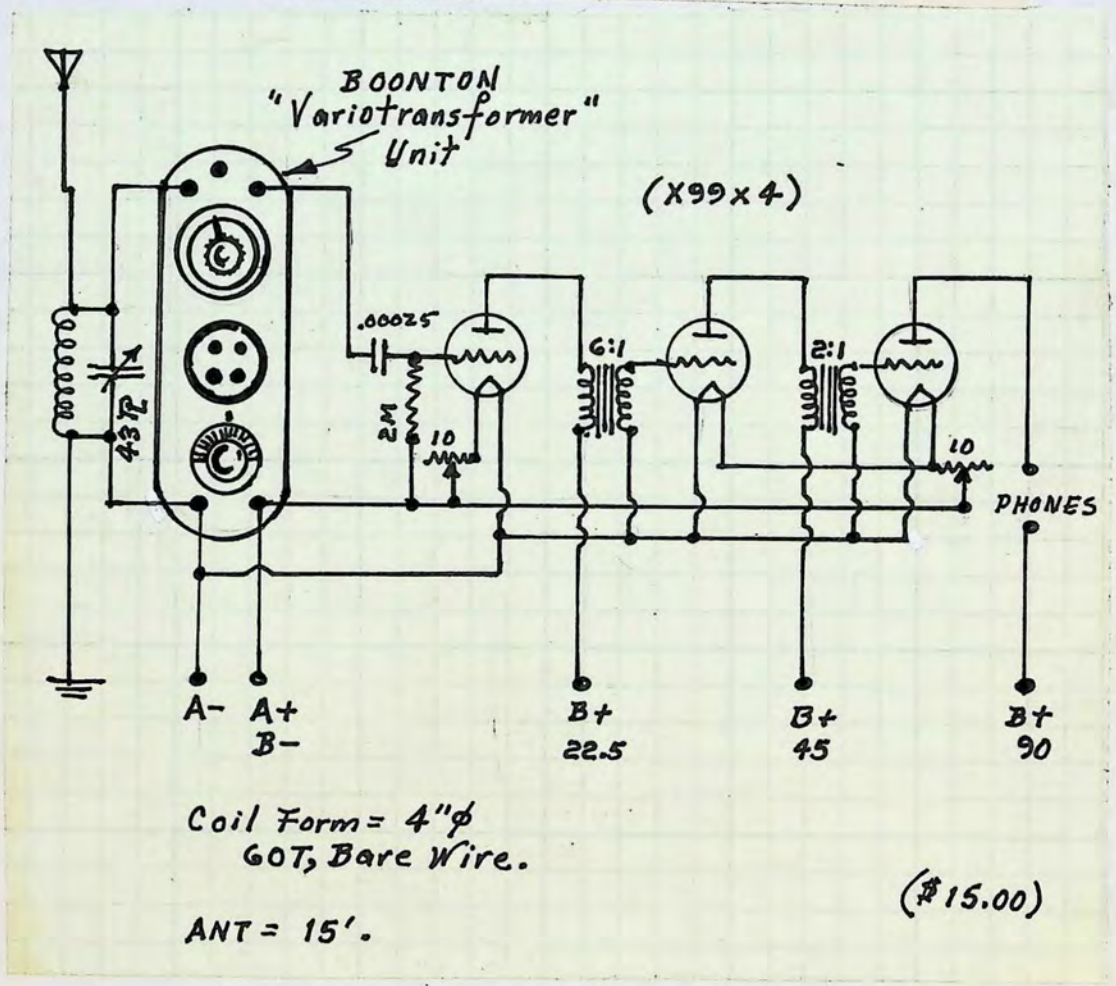
* * *

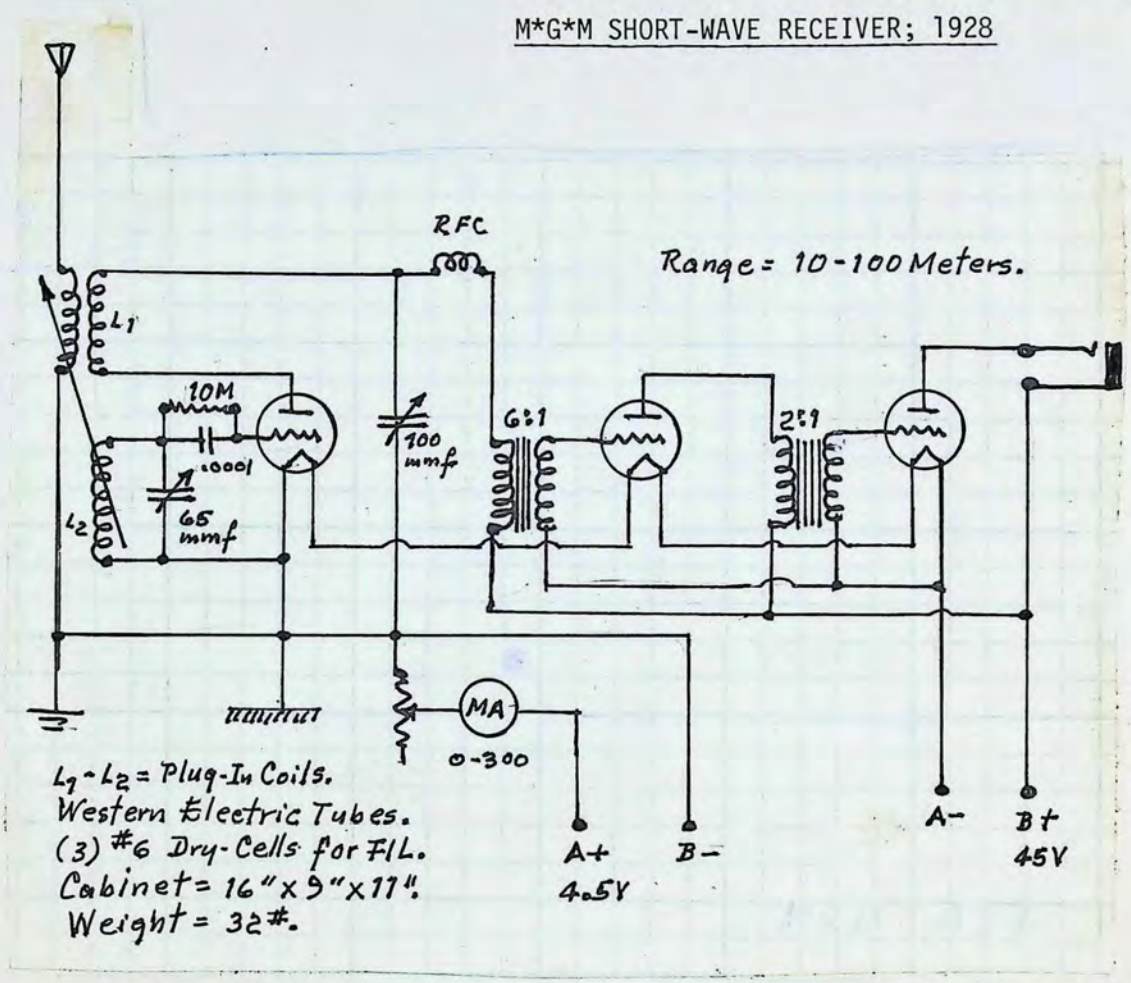
THE BOONTON MODEL 5 "VARIOTRANSFORMER"



The Boonton "Variotransformer" was a combination variometer and variable condenser, and during 1922 enjoyed a spate of popularity. The unit shown could also be cascaded to make-up a conventional T.R.F. of the times.

BOONTON RUBBER MFG. CO.
Pioneers in Bakelite Moulding
624 Fanny Road, Boonton, N. J.





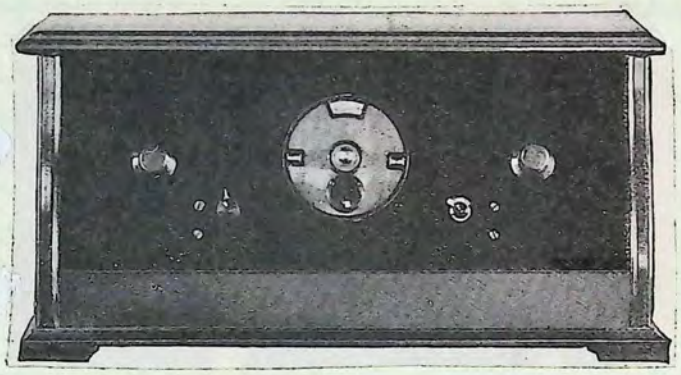
MGM was the first Hollywood studio to use foreign locations, and the first to utilise the convenience and cost-effectiveness of a receiver and transmitter on site. This was in the days before long-distance telephones could be found in Darkest Africa, and satellite transmissions were feasible from the South Seas.

The circuit shown in the above sketch was used on location during the filming of "Trader Horn" in Africa, and in the South Seas for "White Shadows" - two extremely popular films in the late Twenties and early Thirties. The operator, Clyde de Vinna, was also the chief cameraman, as well as a "ham" operator in California. For his work in foreign places he was awarded the gold medal of the Academy of Motion Picture Arts & Sciences in 1929.

* * *

"ARISTOCRAT" TRF WITH HANSCOM UNIT, 1927: SHT.1

SLANT-FRONT CABINET



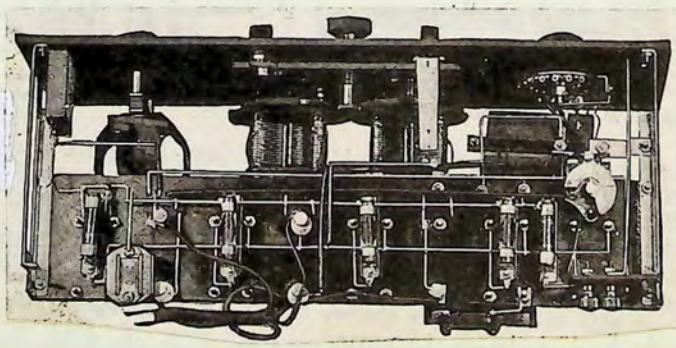
The "Aristocrat" was a circuit designed by Lynch while he was doing one of his usually short-lived stints as editor for RADIO BROADCAST, and was heavily touted for several months in that magazine.

Like the Samson TC receiver, the "Aristocrat" was offered in four configurations, the chief difference being in the audio amplifier sexion, and a variety of off-the-shelf components, except for the resistance-coupled version, which specified Lynch resisto-couplers, and which led in the following year to the Lynch Audio Deck package, detailed elsewhere herein.

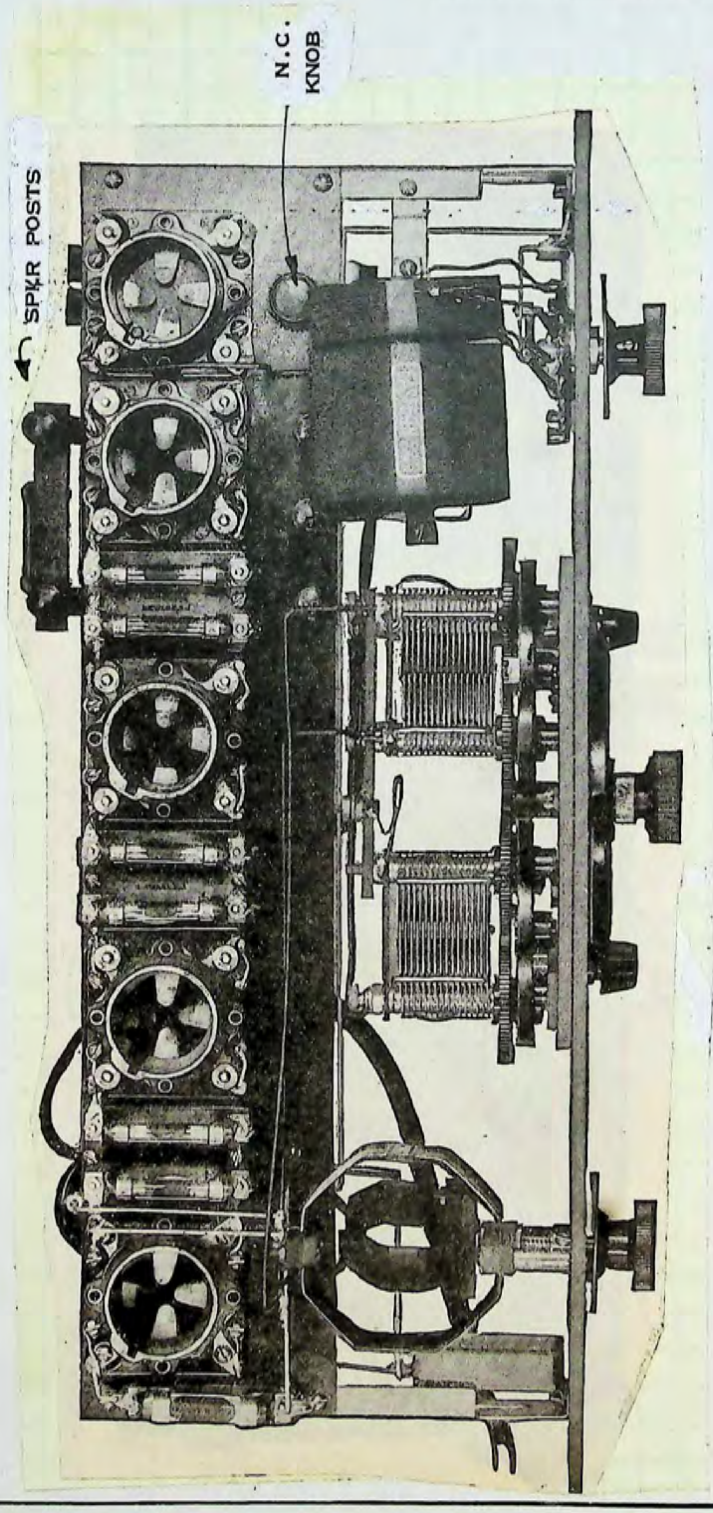
The configuration I have chosen employed the rather neat Hanscom Unit, which permitted a clean panel and ease of operation lacking in other configurations. While resistance-coupling was specified as shown, you may use any of the R-C units manufactured by such as Daven, DeJur, Welty, General Radio, all of which will make an equally neat installation.

PANEL
7 X 18

SUB-PANEL
2.5 X 17.5



"ARISTOCRAT" TRF WITH HANSCOM UNIT, 1927:Sht. 2



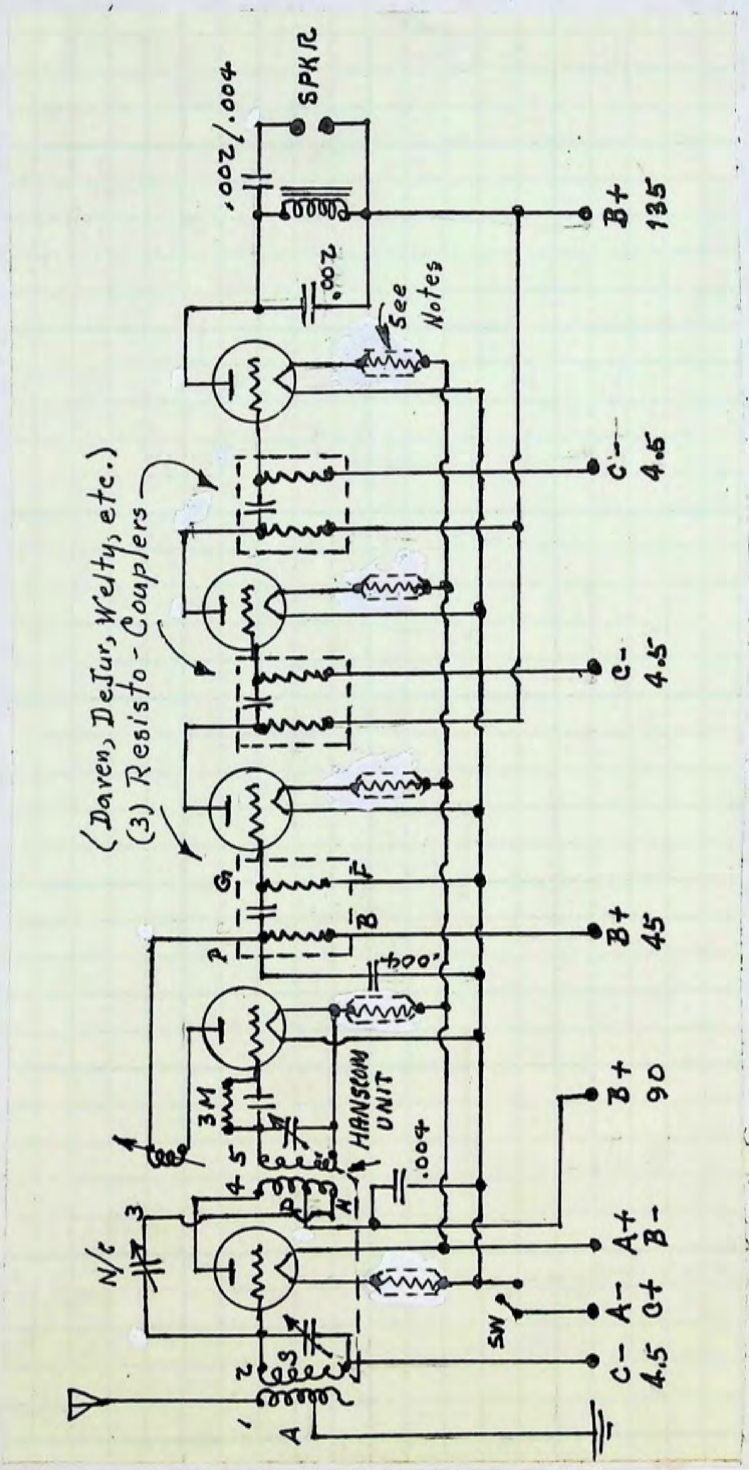
PLAN VIEW

L. TO R.- GRID-LEAK, .004 MFD, RESISTO-COUPLER WITH 100K & 1M-OHM, RESISTO-COUPLER WITH 500K & 1M-OHM, RESISTO-COUPLER WITH 100K & 250K-OHM (.1 MFD CONDENSERS INSIDE COUPLERS).

RIGHT-HAND - SMALL KNOB FOR HAMMARLUND NEUTRALISING CONDENSER; ADJACENT THREE SMALL KNOBS FOR C-BATTERY.

ON PANEL - BENJAMIN BRACKET, .5 MFD BY-PASS, 'KNOCKOUT' RF COUPLER WITH APEX DIAL, HANSCOM UNIT WITH MAR-CO DIAL, FIL SWITCH, 'KNOCKOUT' ANT COUPLER WITH SWITCH, BENJAMIN BRACKET.

"ARISTOCRAT" TRF WITH HANSCOM UNIT, 1927:Sht.3



COIL NUMBERS ARE FOR 'KNOCKOUT' COILS - OTHER MAKES OF COILS MAY BE USED.

(5) BALLAST RESISTORS REQUIRED (AMPERITES) TO SUIT TUBES USED.

MICHAEL BLAN, known to the radio public as "Blan the Radio Man," of 145 East Forty-second Street, New York City,

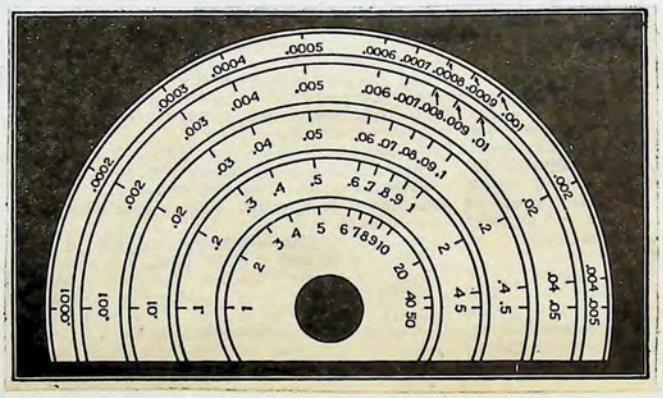
THE BLAN CAPACITY TESTER: Sht. 1

BLAN was probably the most literate of all early radio shop operators. He spoke seven languages and was the man who demonstrated that Radio was also abroad in the rest of the world, by importing every foreign Radio medium. And there were enough recent arrivals from Europe, also interested in the new marvel of Radio, who bought the foreign publications.

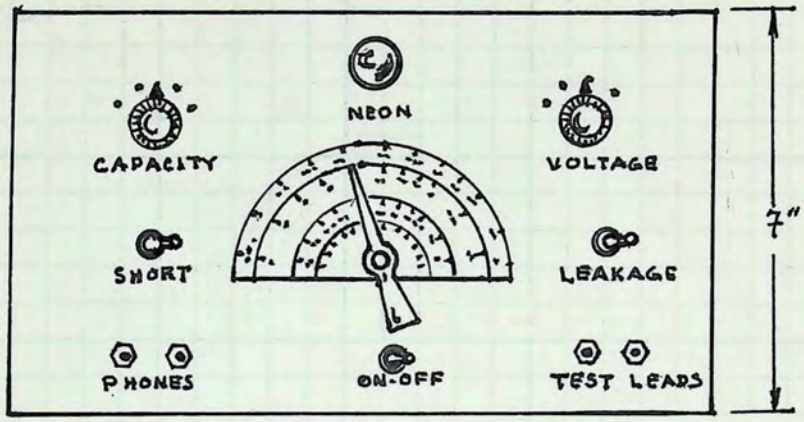
From 1926 until the late Thirties, Blan was an active member of the fraternity, designing and having manufactured hardware and accessories for the hobbyists who choked Cortland Street, and gradually moved uptown.

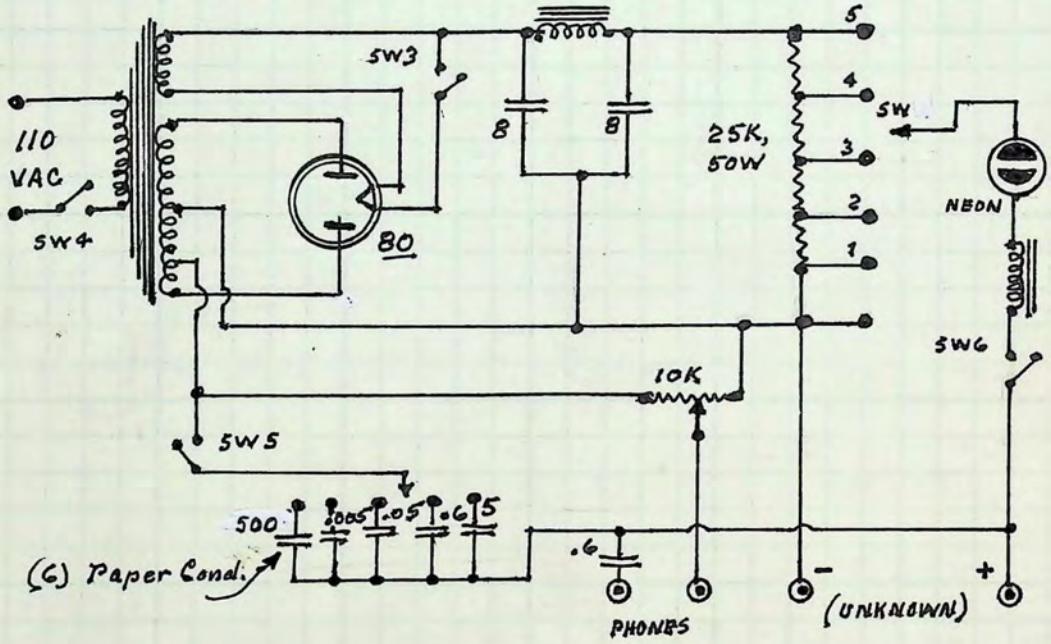
The capacity-checker detailed here was designed by Blan around the well-known Wheatstone Bridge principle. It is straight forward, easy to construct, and once calibrated, will prove to be quite accurate. This is a piece of equipment that you can use "modern" components and not feel you are violating the aura of vintage Radio.

The dial scale shown below is drawn full-scale, and may be cut out and pasted on thin cardboard and affixed to the panel.



BLAN CAPACITY TESTER; Sht. 2





Metal Panel = 7" x 9½" Sub-Panel = 5" x 9"
(3) ON-OFF Switches
(2) Selector Switches
(2) Phone-Tip Jacks

(RC 936) (Sht. 2)

BLAN CAPACITY TESTER; Sht. 3

CALIBRATION

1. Plug in phones; turn on Sw.4.
2. Plug in known condenser @ "Unknown" terminals.
3. Select capacity range w/ switch 1.
4. Ranges:

Sw. Position	Range
1	100mmf ~ .005 mf.
2	.001 mf ~ .005 mf
3	.01 mf ~ .5 mf
4	.1 mf ~ 5 mf
5	1 mf ~ 50 mf

5. Use a range in which the null point occurs w/ pointer (Sw.1) is in the centre of the scale.
6. When hum in phones disappears, secure the pointer to its shaft.
7. The tester is calibrated.

TESTING

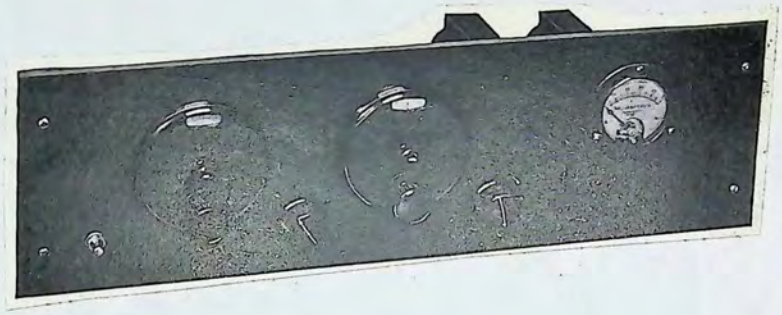
Insert capacitor of unknown value in terminals marked "Unknown", rotate Sw.1 until hum disappears from phones.

Electrolytics: Close Sw.3.
Sw.1 to position 2.
Proceede as for paper, mica, etc.

Leakage: Open Sw.5.
Rotate Sw.2 to rated voltage of condenser.
Voltage Obtained: 50, 100, 200, 300, 400.
Connect unknown condenser; note Neon.
Neon Lights & goes out = Good.
Neon Blinks = Leakage.
Neon Glows Continuously = Short.
An open-circuited condenser will not illuminate the Neon bulb.

(Sht.3)

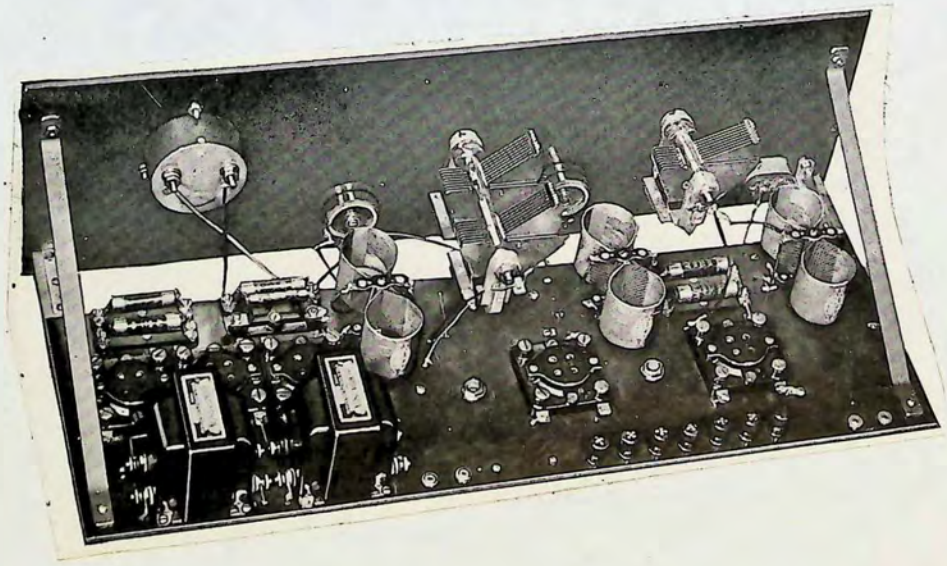
NAKKEN 5-TUBE STABILISED RECEIVER; Sht. 1

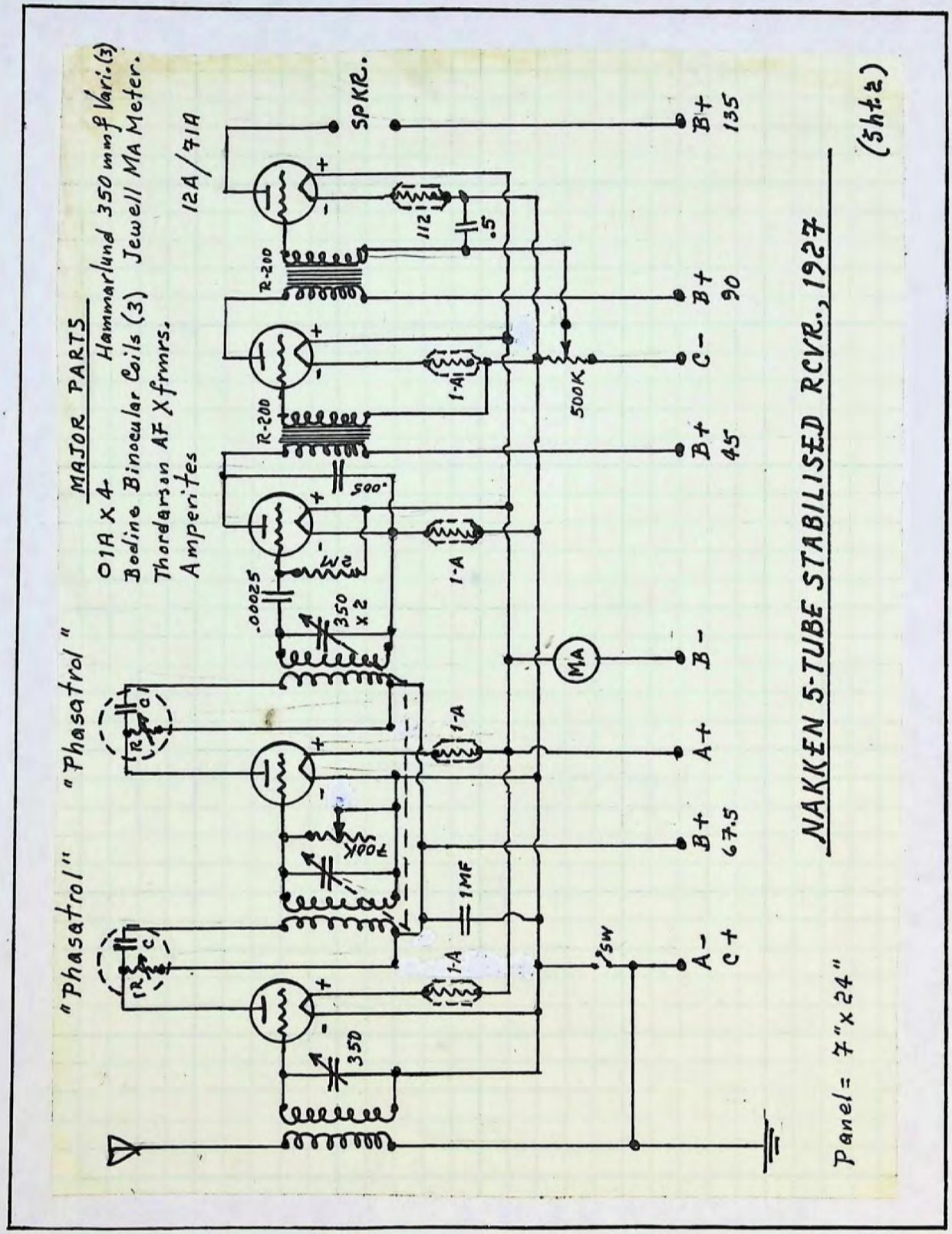


Theo Nakken was a radio engineer of some repute, and he was very fond of Robt. E. Lacault's modulation concept, which he utilised for a small super-het, which is detailed in the Super-Het Monograph.

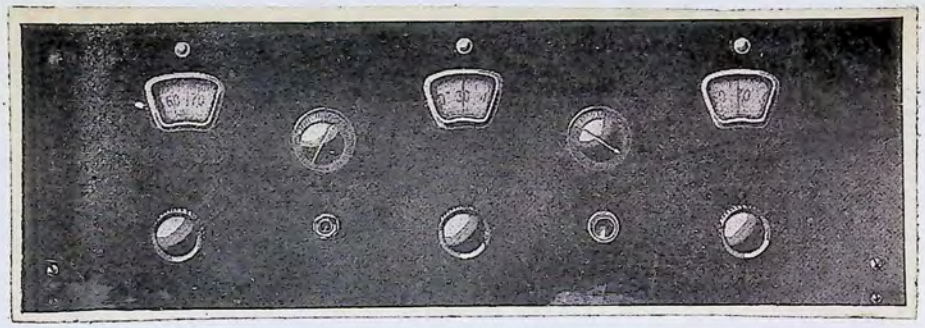
He wrote well and with a sense of proportion, and his circuits, while few by comparison with others, were always soundly engineered, and they always worked exceedingly well.

The receiver shown preceded his super-het, and is interesting enough to be constructed.

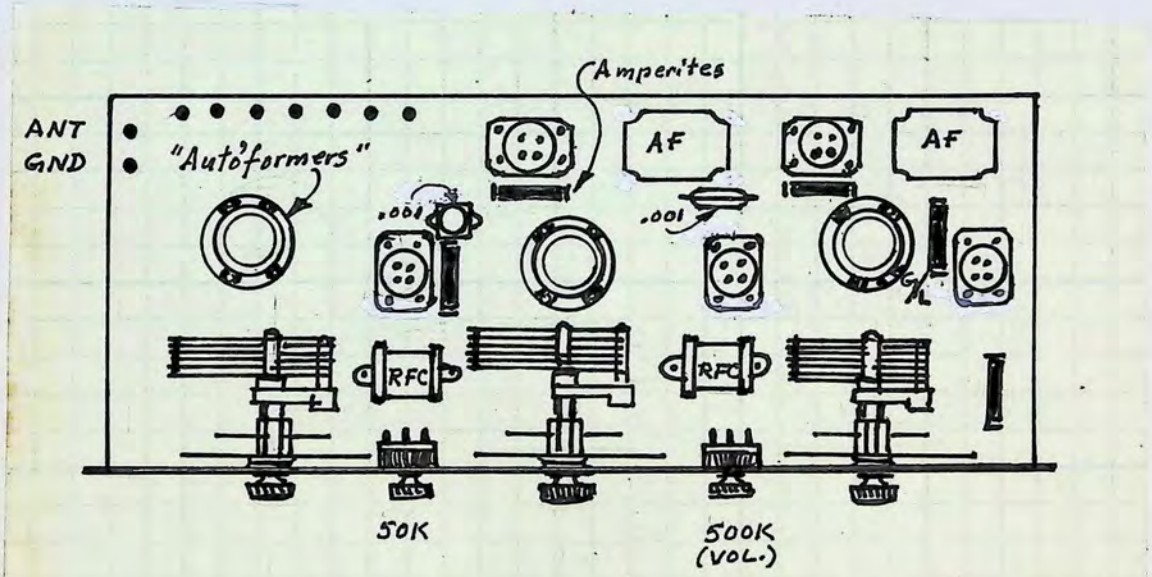



MAJOR PARTS
01A X 4
Bodine Binocular Coils (3)
Thordarson AF Xfrmrs.
Amperites
Hammarlund 350 mmf Vari. (3)
Jewell MA Meter.
12A/71A
"Phasatrol"
"Phasatrol"
SPKR.
R-200
R-200
.00025
350 x 2
350
700K
500K
1MF
.5
.005
1-A
1-A
1-A
1-A
1-A
MA
SW
B+ 135
B+ 90
C-
B+ 45
B-
A+
B+ 67.5
A-
C+
NAKKEN 5-TUBE STABILISED RCVR., 1927
Panel = 7" x 24"
(Sht 2)

NAKKEN "AUTOTRANSFORMER" RECEIVER, 1926: Sht. 1



A very efficient and easily constructed receiver.

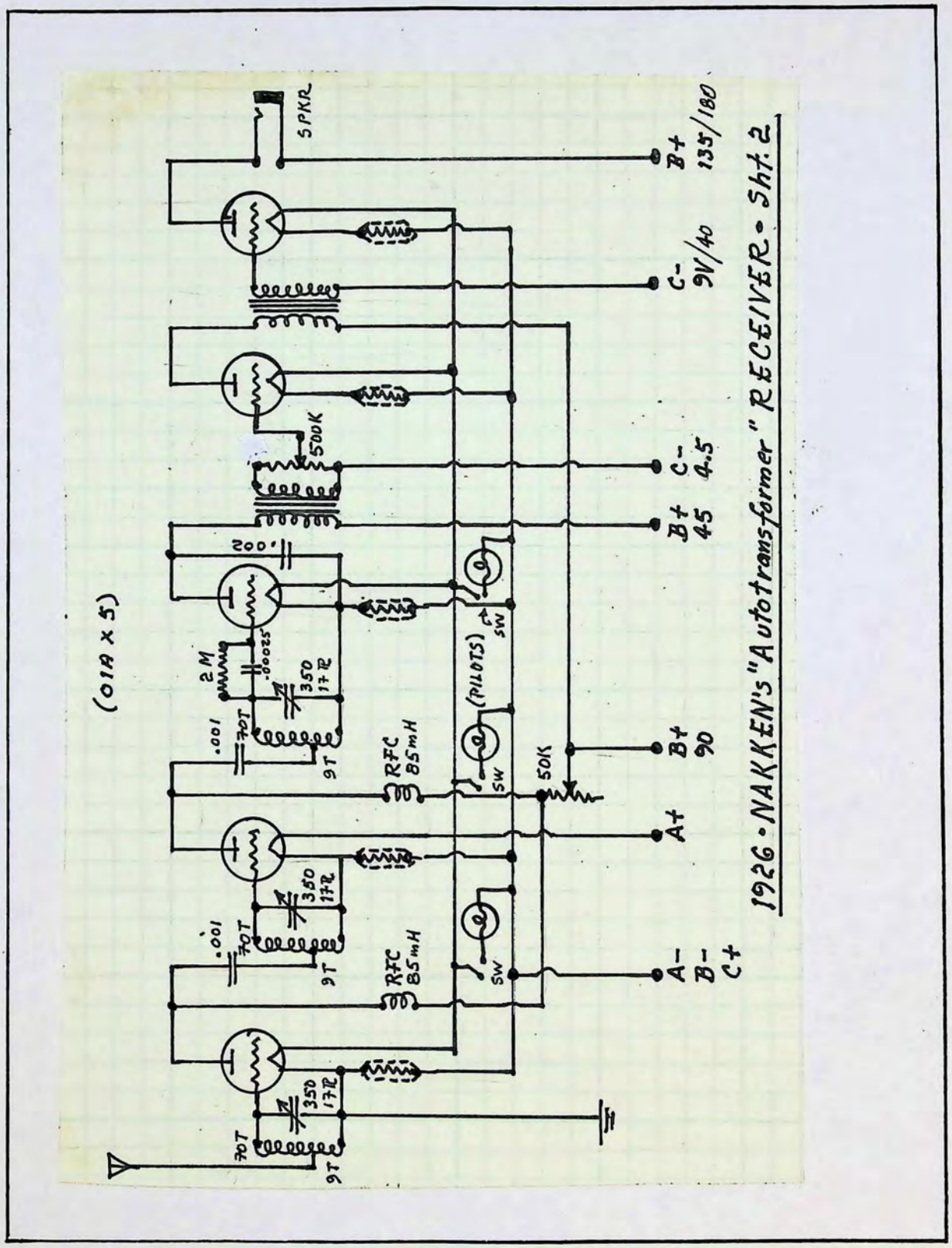


S-M Plug-In Coils (3).*
SLF Variables (3); 350 mmf.
MarCo Illuminated Dials (3).
Electrad Royalty Pot. 50K & 500K.
Samson 85mH RFC (2).
Amperites (5); ¼ A.
AmerTran AF Xfrmrs. (2).
Benjamen Sub-Panel Brkts. (2).

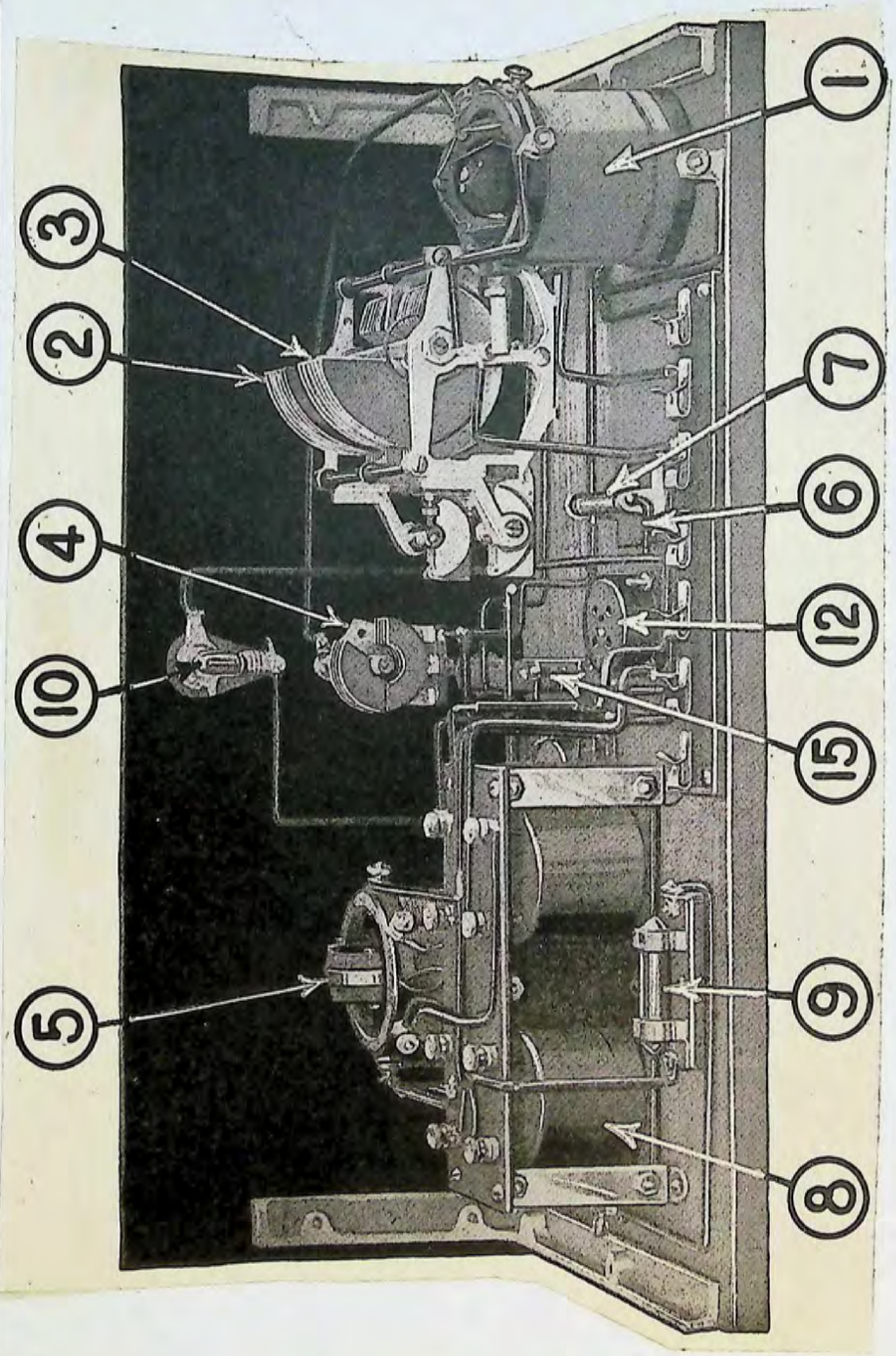
Grid-Leak = 3MΩ.
Condenser .00025.
.001 Cond. (2).
.002 Cond.

* = Auto'former Type.
Panel = 7" x 21"
Base b'd. = 9" x 21"
Coil Form = 2½"Ø x 2½".
#26 DCC Wire.

(RNAH)


1926 • NAKKEN'S "Autotransformer" RECEIVER • Sht. 2
(01A x 5)
SPKR
500K
2M
.001
.00025
70T
9T
350
17Ω
RFC
85mH
(PILOTS)
SW
50K
B+
135/180
C-
9V/40
C-
4.5
B+
45
B+
90
A+
A-
B-
C+

The Dyadyne 4-Tube Receiver

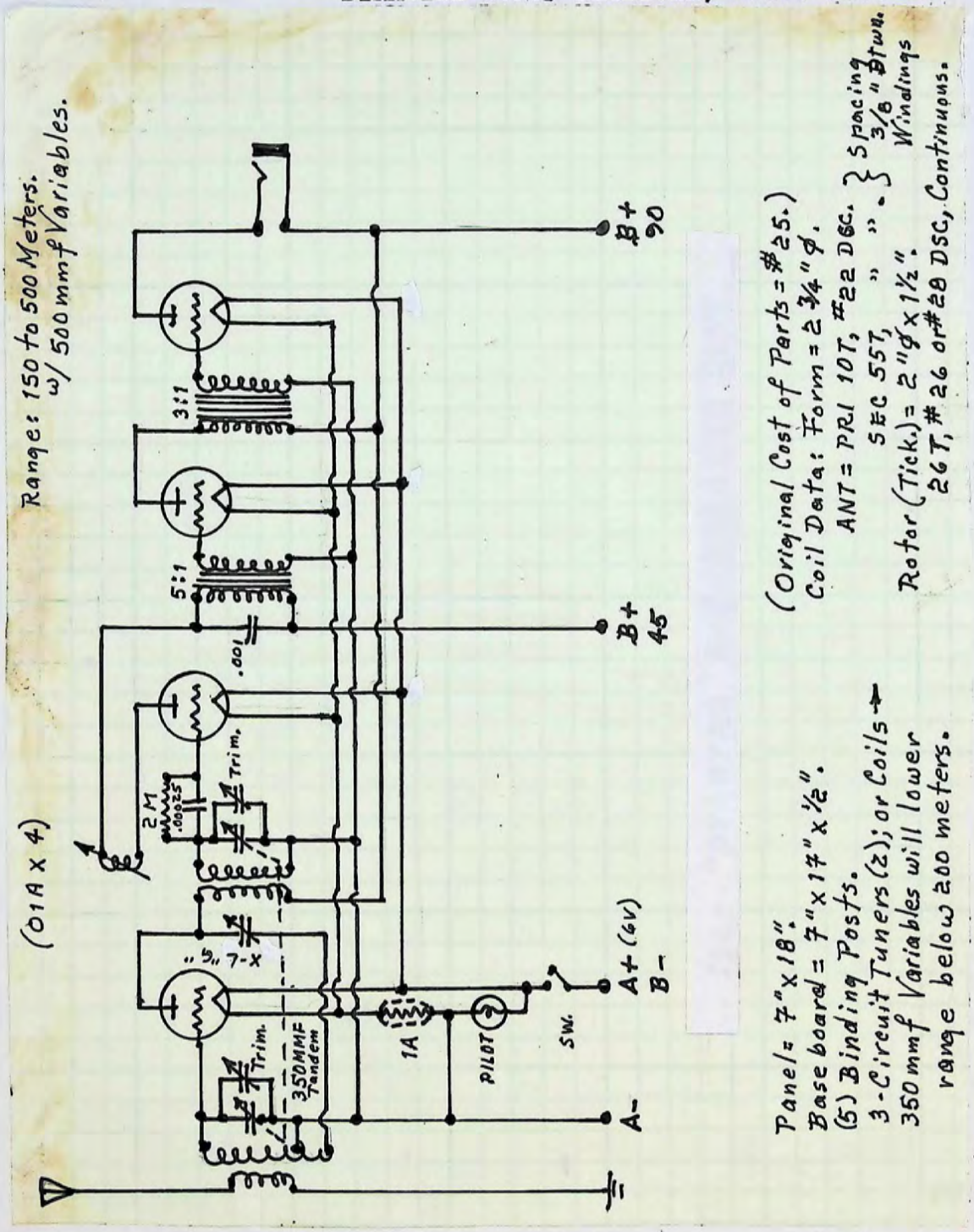


GENERAL PARTS LIST

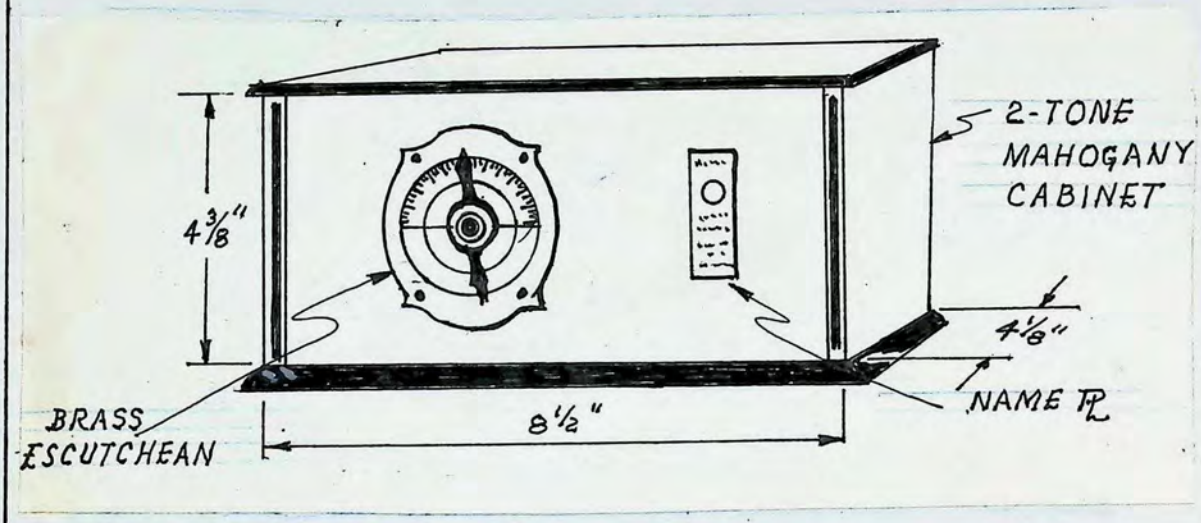
1 & 5 = Bruno 3-Circuit Tuners.
6 & 7 = Grid-Leak & Condenser.
2 & 3 = Bremer-Tully 350mmf Dual Variable.
8 = Peerless "Twin-Aud" AF Xfrmrs.
10 = Pilot Lamp.
4 = 35mm Midget Variable.
9 = 1A Amperite.
15 = X-L "G" Balancing Cond.

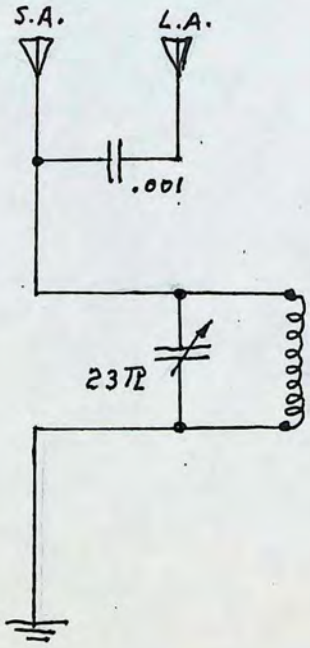
(Sht.1)

DYNADYNE T.R.F RECEIVER, 1927: Sht. 2



LIBERTY "SUPER-RF-BOOSTER", 1924



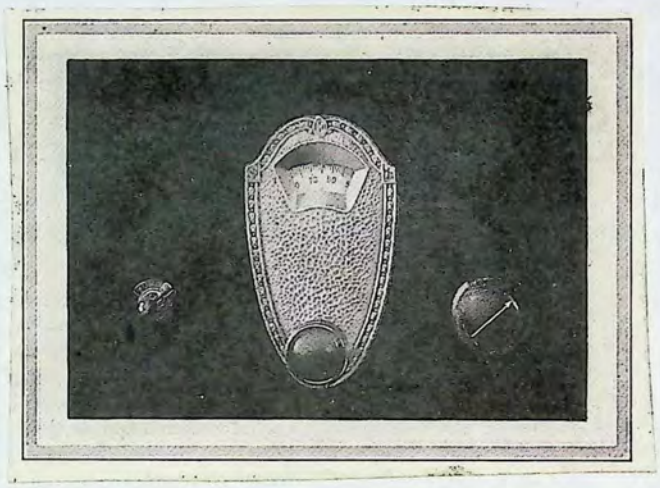


This was a well-made and neat unit, better than most and quite effective when used before the early regeneratives.

LIBERTY RADIO CORP. was based in Cleveland, and also set-up a factory in Los Angeles. I have met hobbyists who believe LIBERTY of L.A. was a seperate operation from LIBERTY of Cleveland - wasn't so.

The LIBERTY radio, which came a couple of years later, was a conventional super-regenerative circuit, again well-made but neither better nor less than a myriad of other similar marques of the time.

CITIZENS SCREEN-GRID RF BOOSTER, 1927: Sht. 1

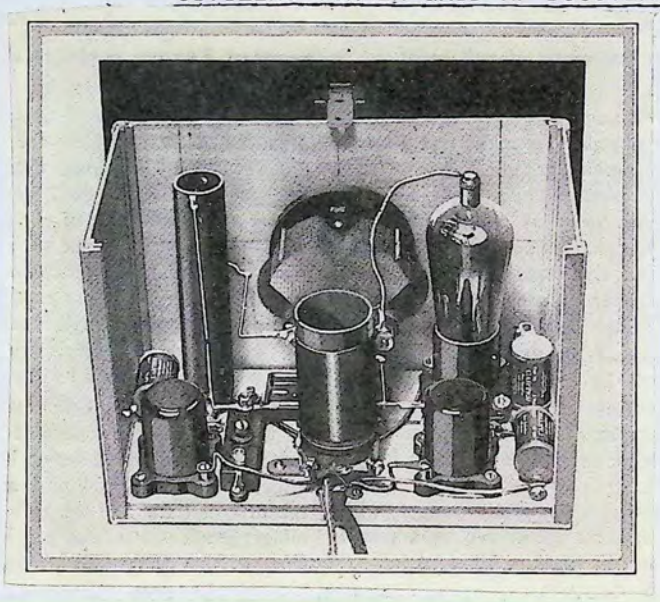


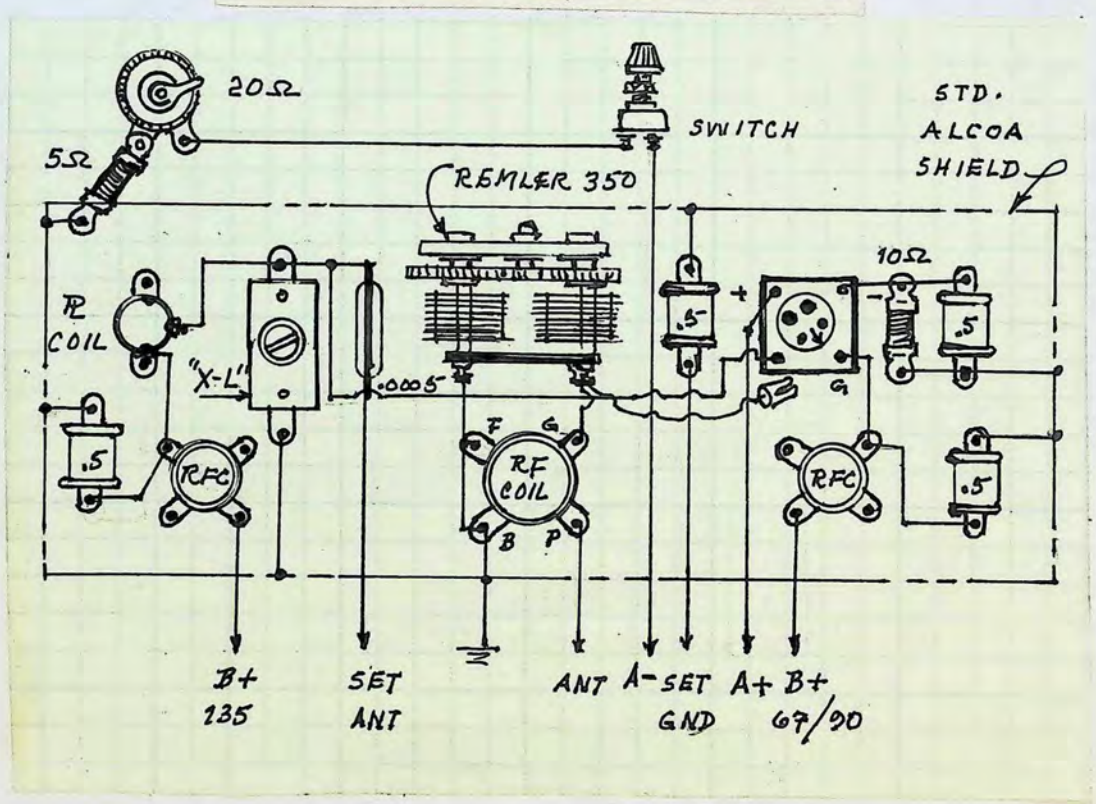
The ongoing preoccupation of early engineers with how to increase the strength of radio frequencies at the receiving end led to some curious solutions, as well as a few intelligent solutions, within the state-of-the-art. Some are shown in these Sketch-Books: some were deliberately passed over.

The RF booster shown here was neat, simple, effective, and easy to build. The under-lying principle was the same as that employed by Flewelling in 1923, among others, with this booster being quite superior due to the improvement in amplification offered by the 22 tube.

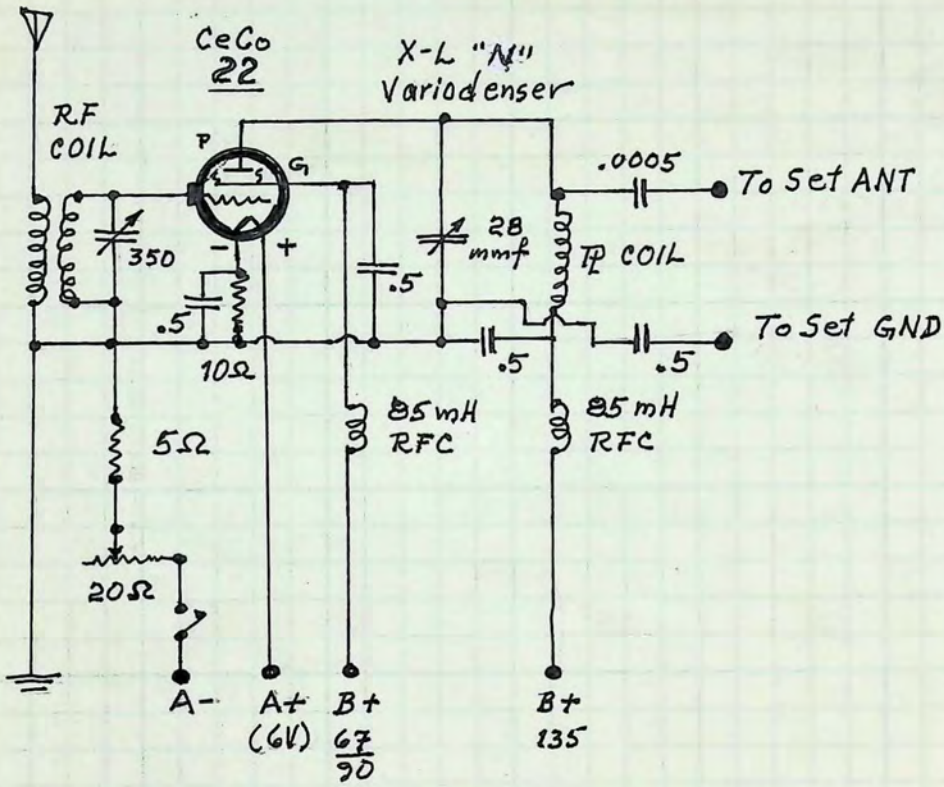
Tuning is not critical, and while Bernback coils were used originally, similar coils by others may be used, or you can wind your own from the data given over-leaf. You can put this booster ahead of any of your early battery sets, and secure an interesting improvement in the volume of your reception, except super-hets. You'll find that it is particularly effective if you are using a loop instead of a wire.

CITIZENS SCREEN-GRID RF BOOSTER, 1927: Sht. 2





CITIZENS SCREEN-GRID RF BOOSTER, 1927: Sht. 3



RF COIL

1½"ϕ Form x 3¼"

PRI = 15T, #26 SSC
SEC = 100T, #26 SSC

(PRI on bottom.)

TP COIL

1"ϕ Form x 5"

400T, #30 Enam.

MAJOR PARTS

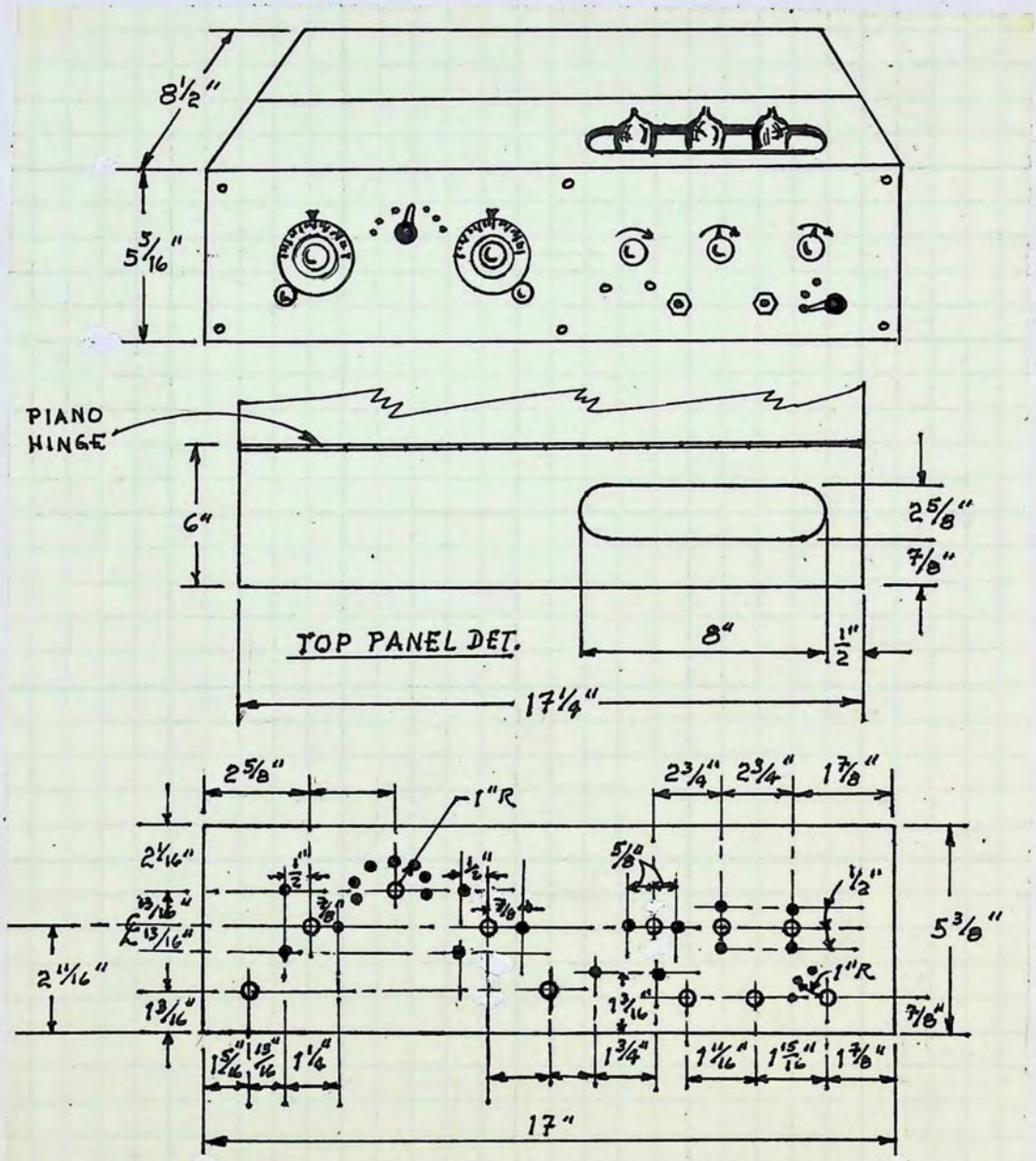
Panel = 7" x 10"
Base = 4½" x 8½"

Alcoa Shield Box
Hammarlund RFC
Carter Rheostats
National Dial
Birnbach Cable (?)
Benjamin UX Sckt.

Comparble parts may be used—
e.g., Remler, Acme, Samson, Electrad, etc.

(CRCB - 9·28)

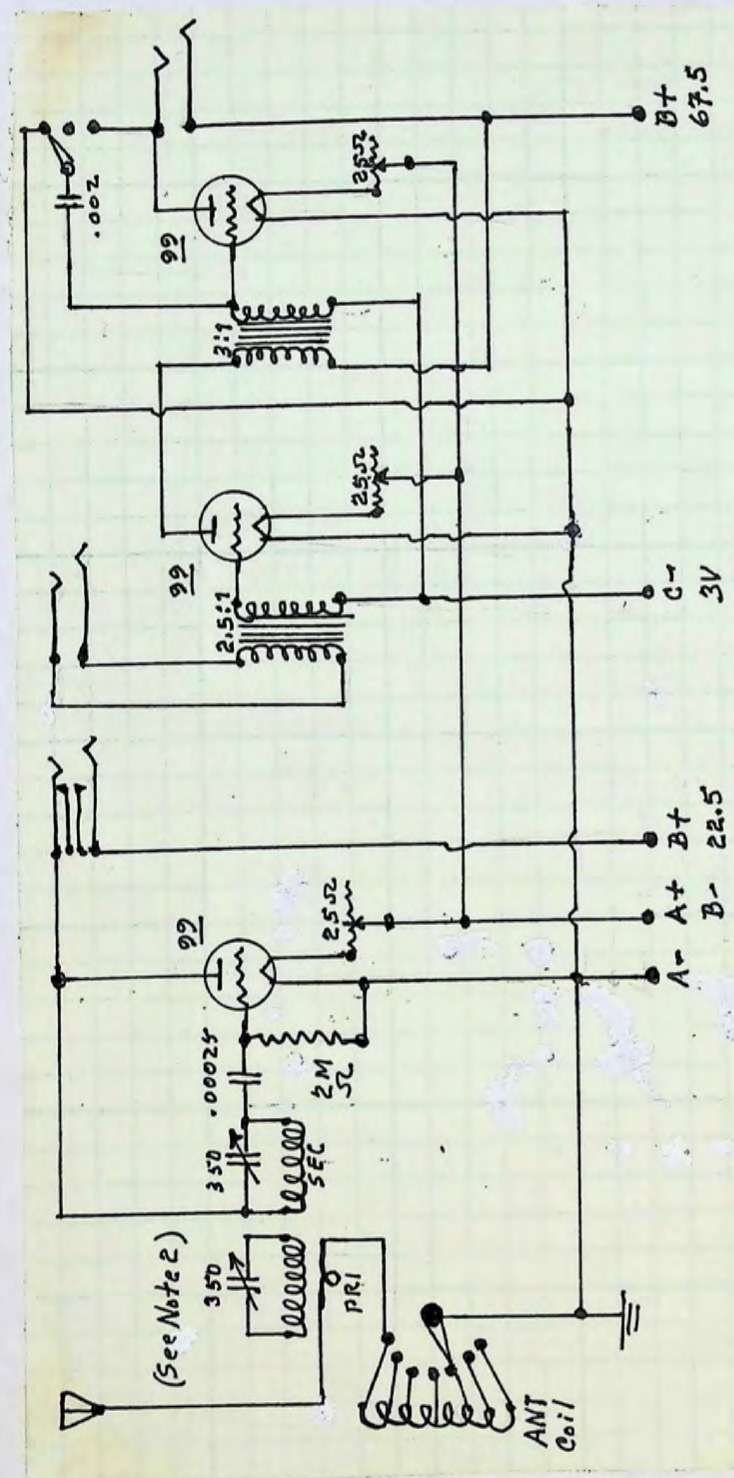
COCKADAY 4-CIRCUIT TUNER, 1925: Sht. 1



PANEL DRILL PATTERN

• = Countersink, except Switch-Point holes (10). Shaft & Jack Holes to suit items used.

COCKADAY 4-CIRCUIT TUNER, 1925: Sht. 3



NOTE: 1. While this was a Regenerative revr., it was better than most & much less given to instability. This was due in large measure to the exotic coil assembly designed by Cockaday, & first used in this basic Cockaday circuit.

2. This was called a Reaction-Stabilizer winding

3. The ANT tuning coil was mounted on the top of the coil @ 90°.

COCKADAY 4-CIRCUIT TUNER, 1925: Sht. 2

COCKADAY'S ORIGINAL PARTS LIST
(Cost = $40)

TAIT 3½"ø Knobs & Dials, as shown.
(2) SE-AR-DE 350 mmf Variable Condensers.
DUBILIER "Micadon" Condensers, .00025 & .002.
Tubular Grid-Leal 2MΩ.
SE-AR-DE Combination Sockets & Rheostats. (*)
(1) DeFOREST Socket.
JENKINS Vernier Rheostat.
(2) PACENT or FEDERAL Jacks.
JEFFERSON AF Xfrmrs.
(6) FADA Binding Posts.
(2) HAYDON-FENTON Switch-Lever & Knobs.
Composition Panel.
COCKADAY Piggy-Back Coil.
(2) HAYDON-FENTON Vernier Controls.
Switch-Points & Stops,

(*)= The KING Combination Socket w/ Rheostat integral w/ it was a better item: it was also prettier, in that it was moulded of veined reddish-brown Bakelite.

All tuning is done w/ the Switch-Lever-upper left. Secondary tuning is done w/ the R.H. Dial. Regeneration is controlled by the L.H. Dial.
Set L.H. Dial @ 100.
Tune R.H. Dial until signal is heard.
Rotate upper Switch-Lever for best ANT tap.
Turn up first Rheostat until tube starts to oscillate.
Back off Rheostat (L.H.) to just under oscillation.

(PR-Cock.-1924)

ON REGENERATION

Regeneration came about when DeForest and Armstrong discovered that the energy flowing in a vacuum tube plate circuit is many times greater than the controlling current in the grid circuit. By taking a small part of this energy and feeding it back into the grid circuit, a still greater change can be brought about in the plate circuit. It was the extent of this change that determined the strength of the signals in the headphones or speaker.

Regeneration was catergorised early on as:

1. Inductive;
2. Capacitive;
3. Resistive.

The first two methods were generally used, and it was found that too close coupling caused a tube to radiate energy as much as half a mile. Needless to say, all regenerative sets radiate, some less than others. As with all other early circuits, the proper point of operation was just before the point of oscillation, not under it, as was more common.

To obtain the maximum results from a regenerative, the winding on the tickler must be in a direction so that the current induced into the ANT circuit will be in the correct direction as regards the incoming signal. Reversing the tickler leads was always the first instruction for correcting a non-operative set. The other factor, and quite critical, was the grid-leak. In consequence, a variable grid-leak was usually recommended and carefully adjusted. Too low a value would cause the tube to block - producing a clicking noise in the 'phones. The leak had to be adjusted until the clicks were barely audible. At that point, the leak was of the proper value.

The dual-winding coils could be honeycomb or spiderweb. A variometer, with the ANT connected to the stator and the rotor to the plate circuit, serves the same purpose. The control of plate and filament voltage was also critical, and a by-pass across the 'phones was mandatory.

The capacitive regenerative is best illustrated by DeForest, circuits for which you will find elsewhere in this

volume. A midget variable across the 'phones in place of a fixed condenser permitted better control, and obviate somewhat the howls and squeals that could not always be cleaned up. No circuit should be constructed where a change in tuning will vary the feed-back effect. This is not easy.

The Reinartz tuner was a form of capacity feed-back with an aperiodic (untuned) ANT, derived, some said, from circuitry designed by Wegeant, Marconi's Chief Engineer. The various Reinartz circuits will be found elsewhere in this volume, and are recommended for a trial construction by those who would like to experiment with regeneratives in their simplest forms.

The 3-circuit tuner was the earliest type of feasible feed-back circuit, and was also the most difficult to operate properly, as three different circuits had to be brought in exact co-incidence for an audible and reasonable signal. In the jargon of Sears-Roebuck shoes - Good, Better, Best - the 3-circuit regeneratives of Armstrong were the best.

Body-capacity will prove to be an eternal bugbear with any regenerative. In the early days it was minimised but never completely eradicated by shielding the set with sheets of conducting material on the back of the panel, and grounding it through the A- terminal post. The shielding was copper. The values of the components used were also critical, which accounts for why so many early regenerative schematics have the admonishment "Cut & Try".

While the regenerative and super-regenerative were genuine advances in the art, in this age of an Instant-Everything syndrome, it is difficult to imagine some modern hobbyists having the patience and dedication to spend half an hour manipulating knobs and switches to isolate a signal. But when a signal can be pulled in and cleaned up, you will find that the tone is amazingly pure.

The first consideration for operating a regenerative is given the ANT. It should be no longer than 10'!!! This, of course, is in patent contradiction to the usual instruction for early antennae, with 100' being the most popular length, including lead-ins. A good ground was essential. The majority of regeneratives employed plug-in coils, usually those manufactured by Remler, Cota, Pacent, with Remler being the best constructed and having the number of turns stamped into the cover. Other manufacturers resorted to pasting a label inside their coils, giving such information, and over time such labels wear off or become obliterated. The number of turns

is a controlling factor, and were always preceded by "L", with the number of turns following. They could not be mixed, except under certain conditions. For example: L-50/L-75/L-50 if used for the standard triple coil regenerative, will result in much noise but no readable signal. For standard broadcasts, all coils should have the same number of turns.

With the two and three coil mounts, it is critical that the coils, when in the closed position, show the same amount of space between their edges - that is, the space must be parallel around the complete circumferance. Otherwise, you may expect distortion. Vernier dials are also mandatory, with the gear-driven types preferred. Early vernier dials employing a friction-drive become sloppy in time, and cannot be adjusted. The so-called add-on verniers are generally useless.

The regeneratives are all prone to instability. If the set is jarred even casually, an electric light seitch is thrown, a neon sign or a passing car with an altenator, or even if you happen to sneeze suddenly, will cause the set to start howling. Matching the impedance of the headphones did help considerable, with Baldwin and Brandes 'phones the best. While regeneratives will wlays produce a stronger signal than a crystal set, they were never as strong as sets employing transformer-coupled AF sexions.

Reference to a good ground has been made. Late model regeneratives, such as those offered as kits by such as Eico, Heath, Knight, etc., attempted to follow the latter day use of a metal cabinet as ground, but none were satisfactory. A very good ground can be had by making a cylinder of wire-mesh about three inches in diameter and filling it with charcoal; then driving it into the ground. The ground-rod is then driven through the centre of the charcoal filling, and left there. The charcoal draws moisture from the earth, and increases the effectiveness of the ground-rod.

You will also find that using your body as an ANT while trimming the controls, will prove more satisfactory than a loop or a wire. Simply connect a jumper to the ANT post and hold on to the other end with your free hand. The wiring, itself, being equally critical, should be laid-out so that grid and plat leads are never in parallel, as this will induce currents into the grid leads, either by inductance or by electrostatic action. These wires should cross only at right angles.

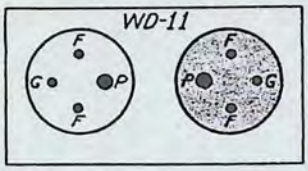
It was extremely difficult to keep regenerative circuits stable - that is, so that they would stay at their max-

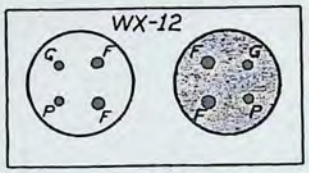
imum amplification point. This was due to the fact that any change in the constants in the ANT circuit reacted on the grid circuit, throwing the circuit in and out of resonance. The circuit would oscillate for a few seconds, and then quit, resulting in a blasting signal that would suddenly cease at predictable or periodic intervals. Then the howling begins.

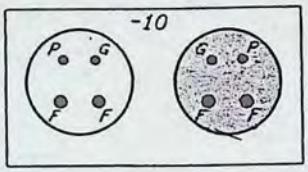
Any change in wavelength made it necessary to make a change in the setting of the regeneration control. This had to be done to keep the regeneration at maximum efficiency. If all this suggests that tuning a regenerative set was tedious, it was, and if you like challenges, try constructing any one of the early regeneratives. It will prove to be an educational experience of the first magnitude. Of all the circuits I have constructed over the years, the regenerative circuit proved to be the most stubborn and the most frustrating. When they worked, they worked brilliantly - for awhile, and then more subtle adjustments had to be made.

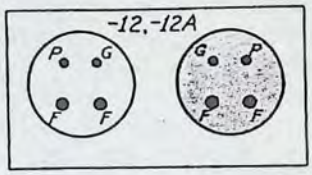
QUICK REFERENCE
TUBE BASE AND SOCKET LAYOUT CHART

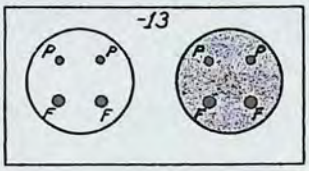
Underside of Socket and Base — Top of Socket

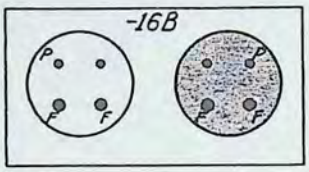


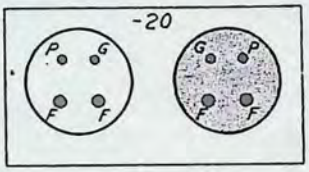


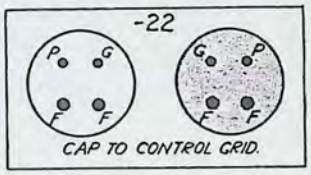


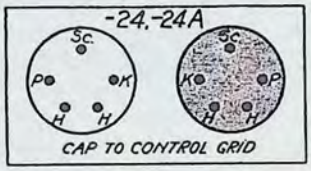


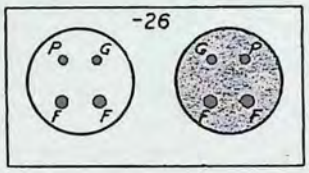


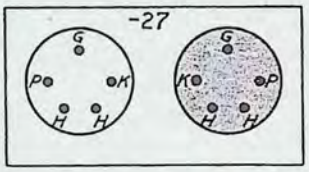


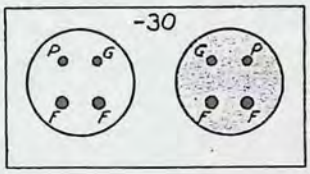


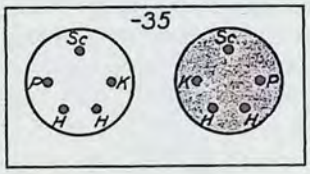


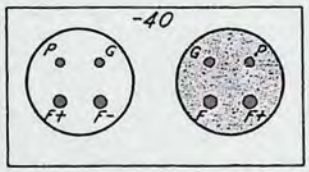


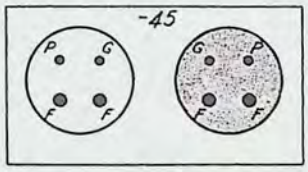


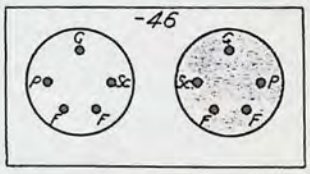


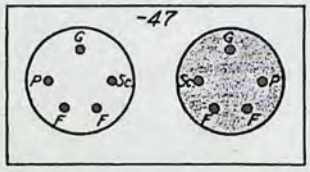


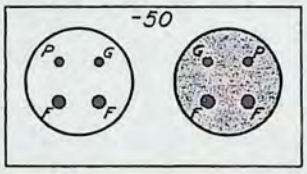


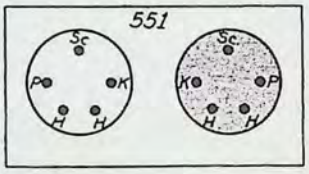


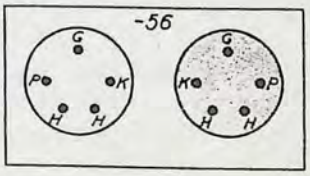


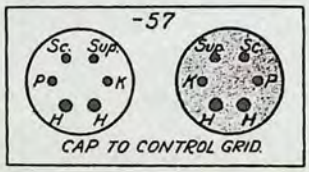


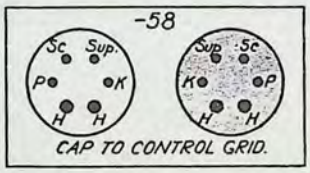


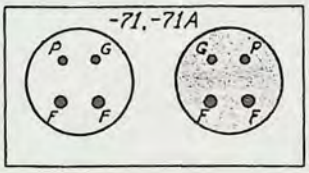


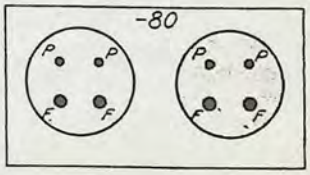


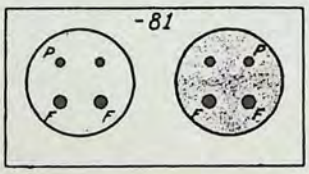


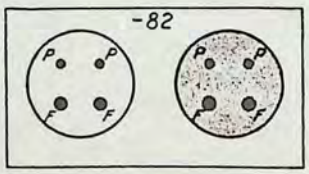


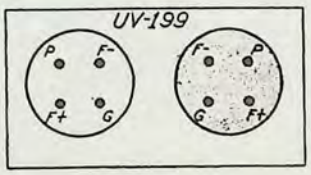


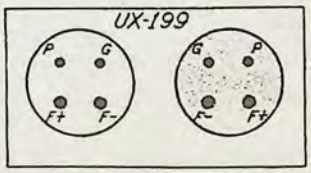


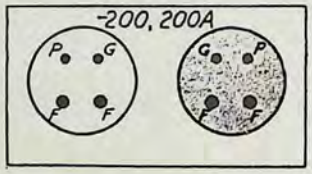


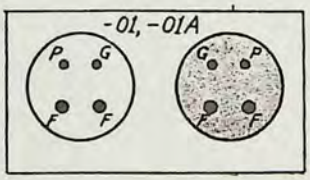


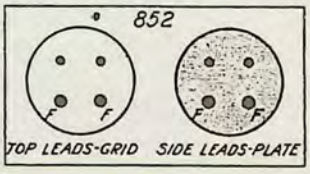


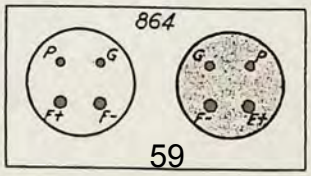












Radio Replicas of the 1980s: Tunemaster Evaluation

by Andrew E. Mooradian

Enter the Tunemaster radio a replica of the 1940 Sonora Excellence 301. The original Sonora was a European made 3 band radio which in its day was state-of-the-art and only a few were made, making the original a rare set. The Tunemaster made it's debut in February 1989 and is distributed exclusively through the Sharper Image stores and catalog at a cost of $199.00.

In 1987 at a Tokyo design exhibit featuring the era of Bakelite, the Sonora was selected from nearly 100 other bakelite radios as the most exceptional radio in design. This gave the folks at The Sharper Image the idea to reproduce what was felt to be the best radio of its time. Unfortunately this was much easier said than done since this is a rare set and would be difficult to locate one to duplicate.

As luck would have it the J. Paul Getty Museum in London located one and the owner of the set was persuaded to part with it. As usual the owner sold it for a price. Now the replication process could begin.

Next the task of reproduction of the Sonora was given to Sonic Electronics. This involved one basic idea which was to produce an attractive radio but still keep the flavor of the original in both design and operation, using today's technology. The actual cabinet reproduction process included a minor resizing to accomodate the smaller chassis.

The only real major differences between the replica and the original is that the replica is 6" shorter, 7 bands instead of 3, cardboard back is now plastic (same shape of cabinet), additional controls are located on the rear panel. Colors offered are Ivory and Candy Apple Red (original color brown).

Much thought has gone into the manufacture of this replica, some features you can not see are brass inserts for screws to secure rear panel, electronics mounted on a plastic frame for easy removal and sealed speaker. The finish is also flawless and is a high grade automotive enamel which is a time consuming task to get perfect, especially the Candy Apple Red color. The only problem I can see with the finish is it will tend to wear out, especially the Candy Apple Red and the underlying Ivory color will show through. In my opinion the color should have been added at casting time to have a permanent color embedded in the plastic.

I could not find any imperfections in the finish or other assembly flaws, so definitely quality control has not been overlooked in this replica.

What does the Tunemaster offer? The Tunemaster is the ultimate in state-of-the-art technology housed in an attractive cabinet. Below is a list of specifications for the Tunemaster.

Specifications:

7 Bands: AM, SW1, SW2, FM, AIR, VHF, WEATHER
5 Watt Audio Amplifier
5" Pioneer Enclosed Speaker
Headphone Jack
Speaker Output
Antenna: 75 ohm, 300 ohm
Aux Input & Output
BFO switch
Fine Tuning & Tone Controls

This is a very flexible radio as you can see from the specifications. One can play Old Tyme Radio Shows through the radio using the Aux Input jacks, no need to buy an AM Broadcaster. Two Antennas are included for use with the Shortwave and VHF bands. The massive 5" speaker and the 5 Watt amplifier produce excellent sound, not found in most radios today.

If this sounds good wait until you turn it on and put it through it's paces. Tuning is very accurate and sturdy feeling not slippery, which make tuning very easy especially while tuning the shortwave bands. The shortwave band will receive Moscow, London, Germany, Spain just to name a few. These were easily obtained with the included antennas on the first time using the radio.

The set comes with an excellent manual which details all controls, and includes a tuning chart. Besides the manual a demonstration cassette is included which is both instructional as well as informational.

I feel that this set is the best replica set available today, although the set is more expensive than other replicas it offers many features not found elsewhere. The Sharper Image and Sonic Electronics in my opinion deserves an A+ for a fine radio, which is destined to become a classic.

I would personally like to thank Mr. Tim Simon, Sonic Electronics and Edith Golden, The Sharper Image for the information provided.

EDITOR'S COMMENT

I have received numerous inquiries about Michael T. Kirby, P. O. Box 4282, Panama City, FL 32401. Even though he is not a subscriber of "Radio Age", callers report that he answers wanted ads. Some have sent money and received no merchandise. His telephone number is non-published so "buyer beware".

ODE

WE are the music-makers,
And we are the dreamers of dreams,
Wandering by lone sea-breakers,
And sitting by desolate streams;
World-losers and world-forsakers,
On whom the pale moon gleams;
Yet we are the movers and shakers
Of the world forever, it seems.

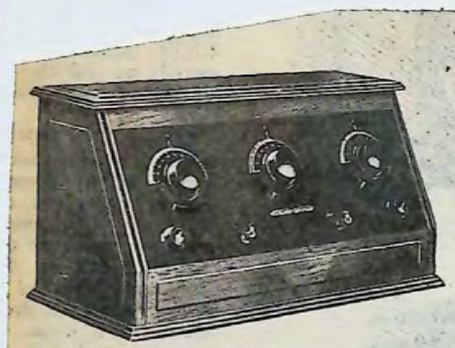
WITH wonderful deathless ditties
We build up the world's great cities,
And out of a fabulous story
We fashion an empire's glory:
One man with a dream, at pleasure,
Shall go forth and conquer a crown;
And three with a new song's measure
Can trample a kingdom down.

WE, in the ages lying
In the buried past of the earth,
Built Nineveh with our sighing,
And Babel itself in our mirth;
And o'erthrew them with prophesying
To the Old of the New World's worth;
For each age is a dream that is dying,
Or one that is coming to birth.

Arthur O'Shaughnessy (1844–1881).

RADOLEK
Multi-band radio
with tuning meter.

Stewart-Warner



Stewart-Warner
Table Cabinet Radio
Model 305
Price, $95.00 (without accessories)

Stewart-Warner
Table Cabinet Radio
Model 325
Price, $80.00 (without accessories)

Stewart-Warner
Table Cabinet Radio
Model 300
Price, $65.00 (without accessories)

Licensed Under U. S. Navy Patents.
5 Tube Circuit

Console Models have built-in Reproducers and storage space for batteries.

Stewart-Warner Console Radio
Model 315
Price $285.00 (without accessories)

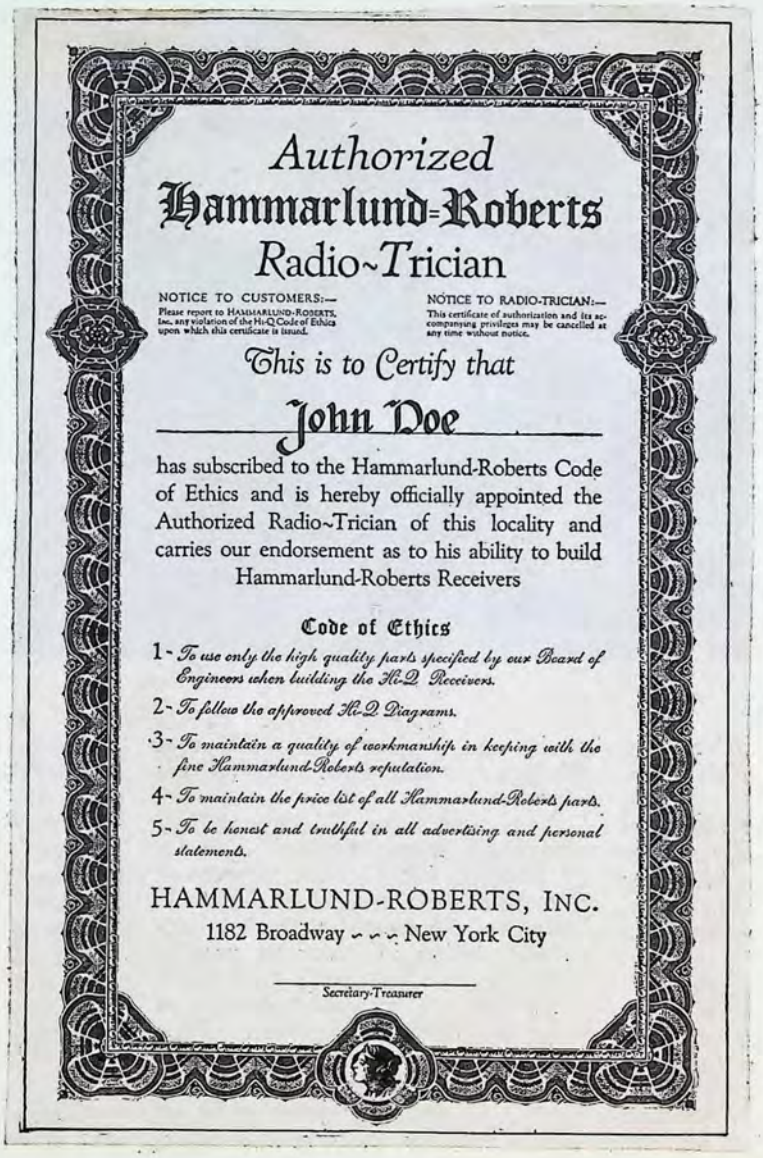
Stewart-Warner Console Radio
Model 310
Price, $175.00 (without accessories)

Stewart-Warner Highboy Radio
Model 320
Price, $450.00 (without accessories)

Prices Slightly Higher West of the Rockies

Stewart-Warner Reproducer
Model 400—Price, $25.00
Model 405, $19.50

(1925)



Authorized
Hammarlund-Roberts
Radio-Trician

NOTICE TO CUSTOMERS:—
Please report to HAMMARLUND-ROBERTS, Inc., any violation of the Hi-Q Code of Ethics upon which this certificate is issued.

NOTICE TO RADIO-TRICIAN:—
This certificate of authorization and its accompanying privileges may be cancelled at any time without notice.

This is to Certify that

John Doe

has subscribed to the Hammarlund-Roberts Code of Ethics and is hereby officially appointed the Authorized Radio-Trician of this locality and carries our endorsement as to his ability to build Hammarlund-Roberts Receivers

Code of Ethics

1- To use only the high quality parts specified by our Board of Engineers when building the Hi-Q Receivers.

2- To follow the approved Hi-Q Diagrams.

3- To maintain a quality of workmanship in keeping with the fine Hammarlund-Roberts reputation.

4- To maintain the price list of all Hammarlund-Roberts parts.

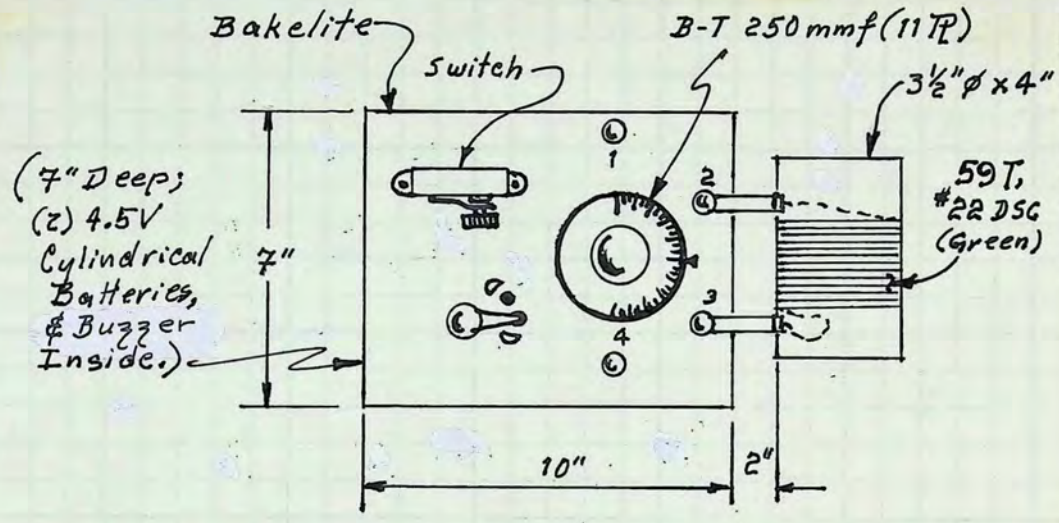
5- To be honest and truthful in all advertising and personal statements.

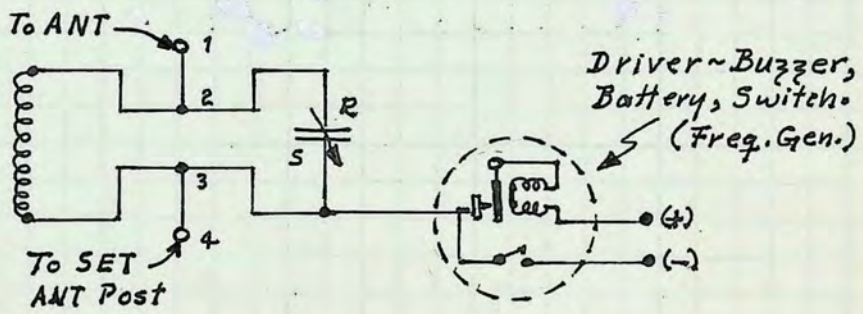
HAMMARLUND-ROBERTS, INC.
1182 Broadway - - - New York City

Secretary-Treasurer

Among the advertising gimmicks of the legitimate manufacturers were window-signs,.lapel-buttons, free counter tube-testers for suctomers, with the manufacturer's name prominently diplayed, etc. Some even set-up classes for dealers and salesmen, of which Bell ("Ozarka") was the most aggressive exponent. The above cut is of another gimmick, the certificate of authentic serviceman or dealer. You will note that in trying to come up with a title other than "Serviceman", a variety of unlikely titles were invented: the "Radio-Trician" of Hammarlund-Roberts did not catch-on, happily.

A SIMPLE & EFFICIENT WAVE-METER, 1924



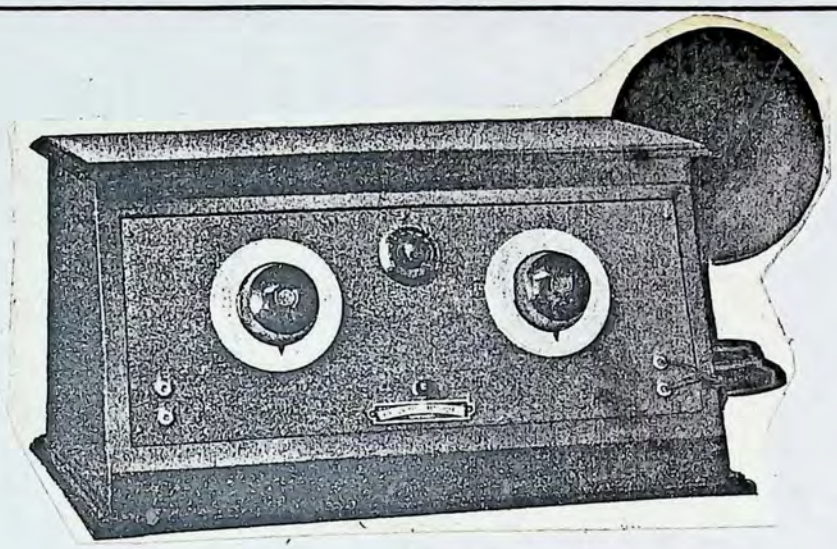


CALIBRATION

1. Tune in various stations from 200 to 550 meters.
2. At each station, move Wavemeter away from set, closing buzzer-switch as you move.
3. Rock variable until buzzer can be heard.
4. Continue moving Wavemeter away from set, repeating process, until signal has been confined to a single division on the set dial.
5. Jot down this reading, & tune in another station, & repeat the process until you have 8 or 10 notes.
6. On graph-paper, plot a curve from your jottings, w/ Wavemeter dial setting & station wavelength. From then on, it is a simple matter to tune-in any desired station.

(OTA 10·25)

Charm and Simplicity Combined
in the
NEW ULTRADYNE



Night-Hawk Super-4

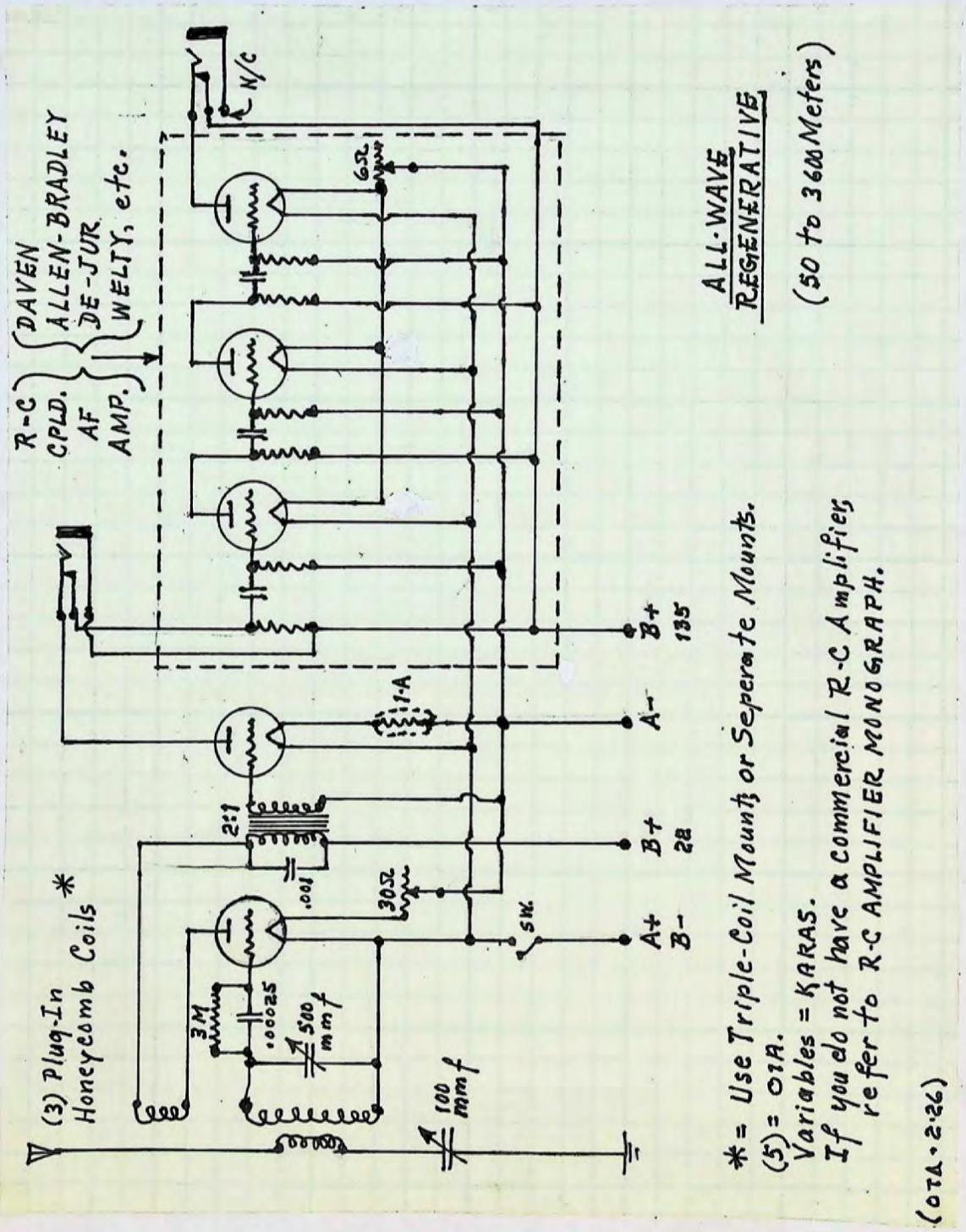
The above cut is included here merely as another example of the myriad of "me-too" sets offered in the mid-Twenties. It was a 4-tube super-renererative set built to Armstrong's patent, and was offered complete with speaker, tubes, and batteries for $70. (The Armstrong super-regenerative circuitry will be found in other sexions of this Sketch-Book.)

The NIGHT-HAWK RADIO COMPANY operated from Chicago, running adverts in the lower priced media, soliciting "500 Representatives" to hawk their wares from the "security of your own home"...sounds familiar? Their operation, like so many others of similar ilk, endured for a little over a year.

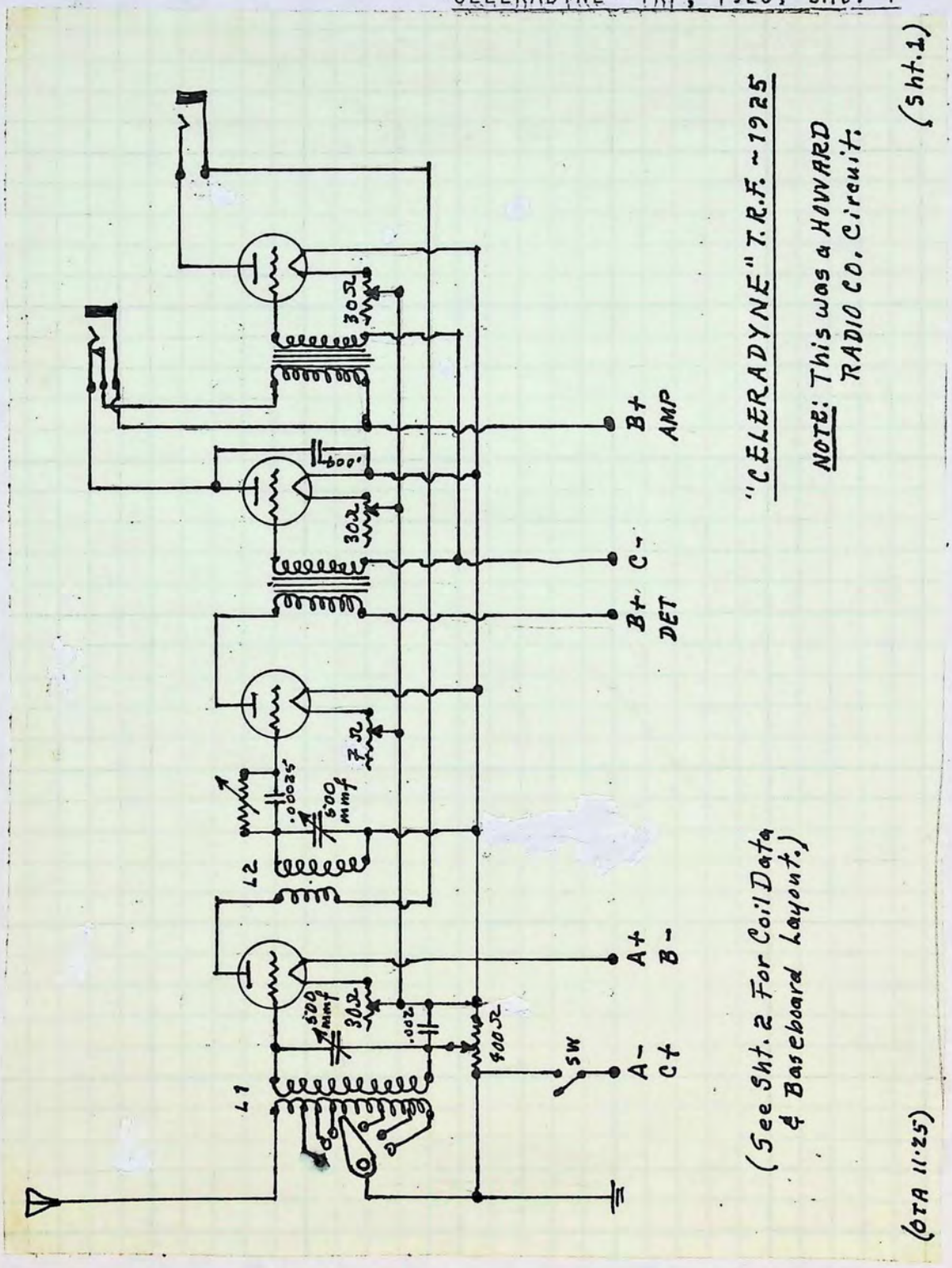
And, also like many another self-styled manufacturer, their sets contained quality parts mixed with cheap components. The Acratune vernier dials, for example, shown above, were excellent items.

* * *

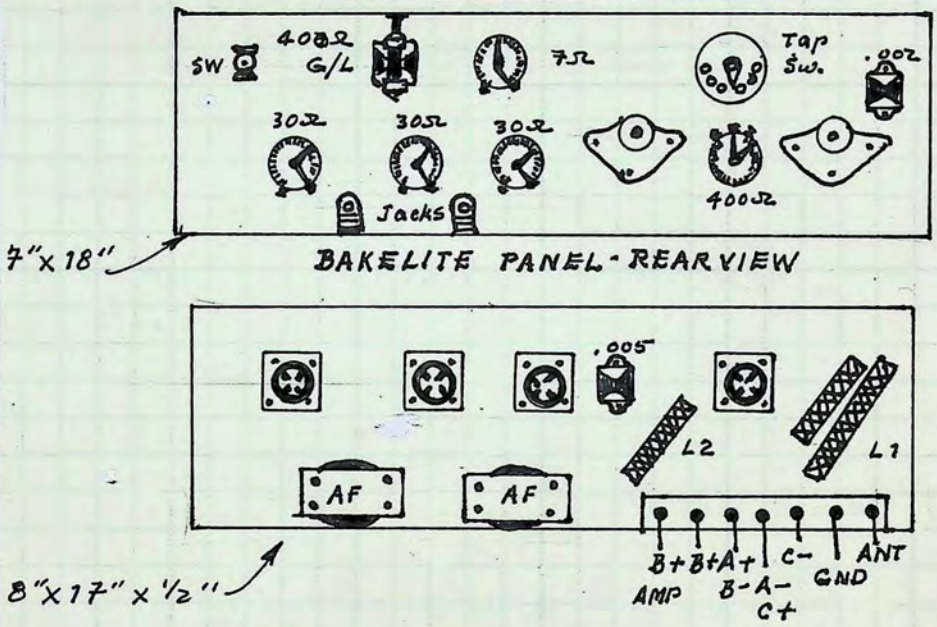
ALL-WAVE REGENERATIVE, 1926



"CELERADYNE" TRF, 1925; Sht. 1



"CELERADYNE" TRF, 1925: Sht.2



COIL DATA

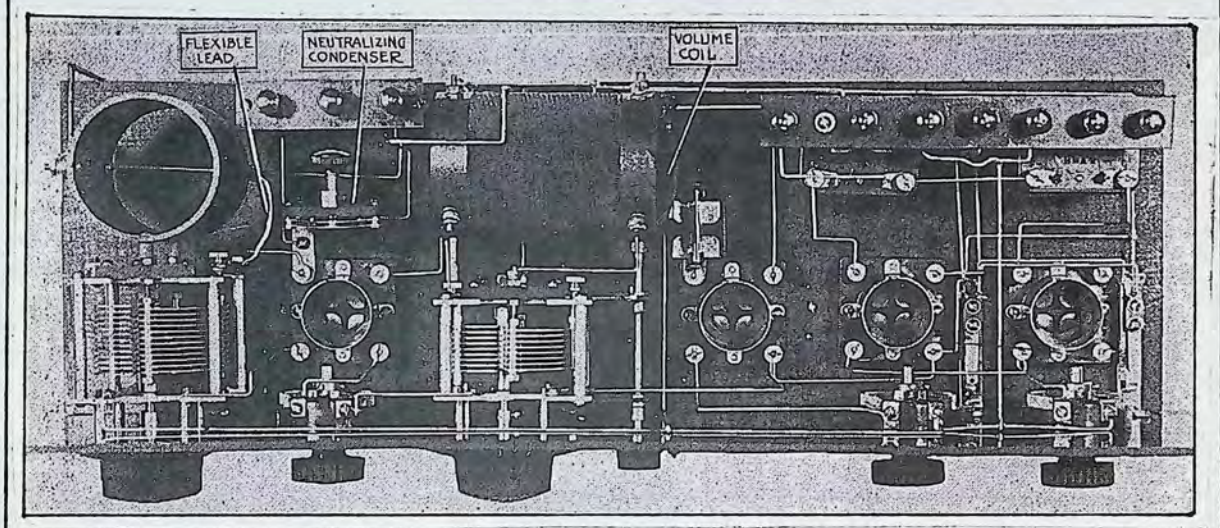
(L1) Tuning Unit: PRI = 32T, #22 DCC, Tapt Every 4 Turns.
Outer End is ANT Terminal.
SEC = 45T, #22 DCC: Outer End = Grid.
Spacing between PRI & SEC = 3/8".
Coil Form = 2 1/2"Ø I.D.

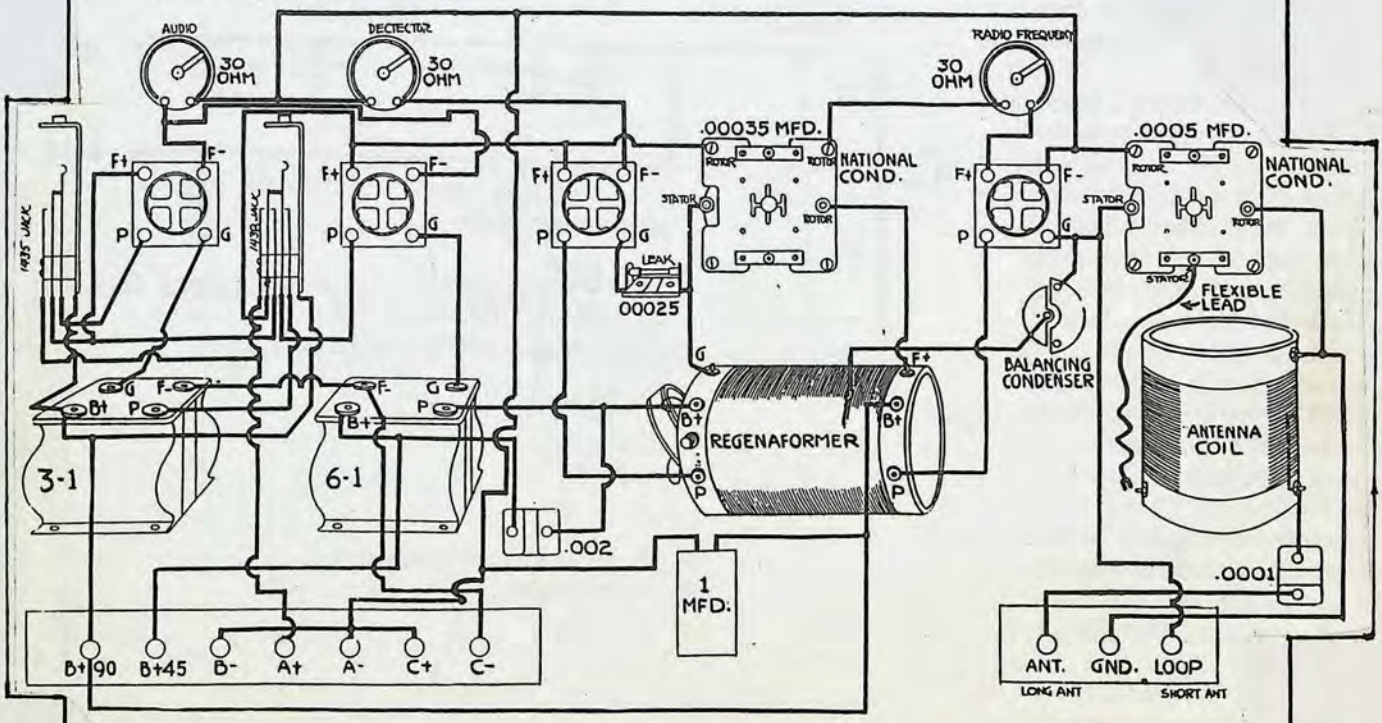
(L2) RF Xfrmr.: PRI = 7T: Outer = TP: Inner = B+.
SEC = 44T: Outer = Grid: Inner = A+.

Angles of coil placement set @ point of least interaction. No definite angle can be given. Commercial Duo-Lateral Coils may be used.

(OTA-10-25)

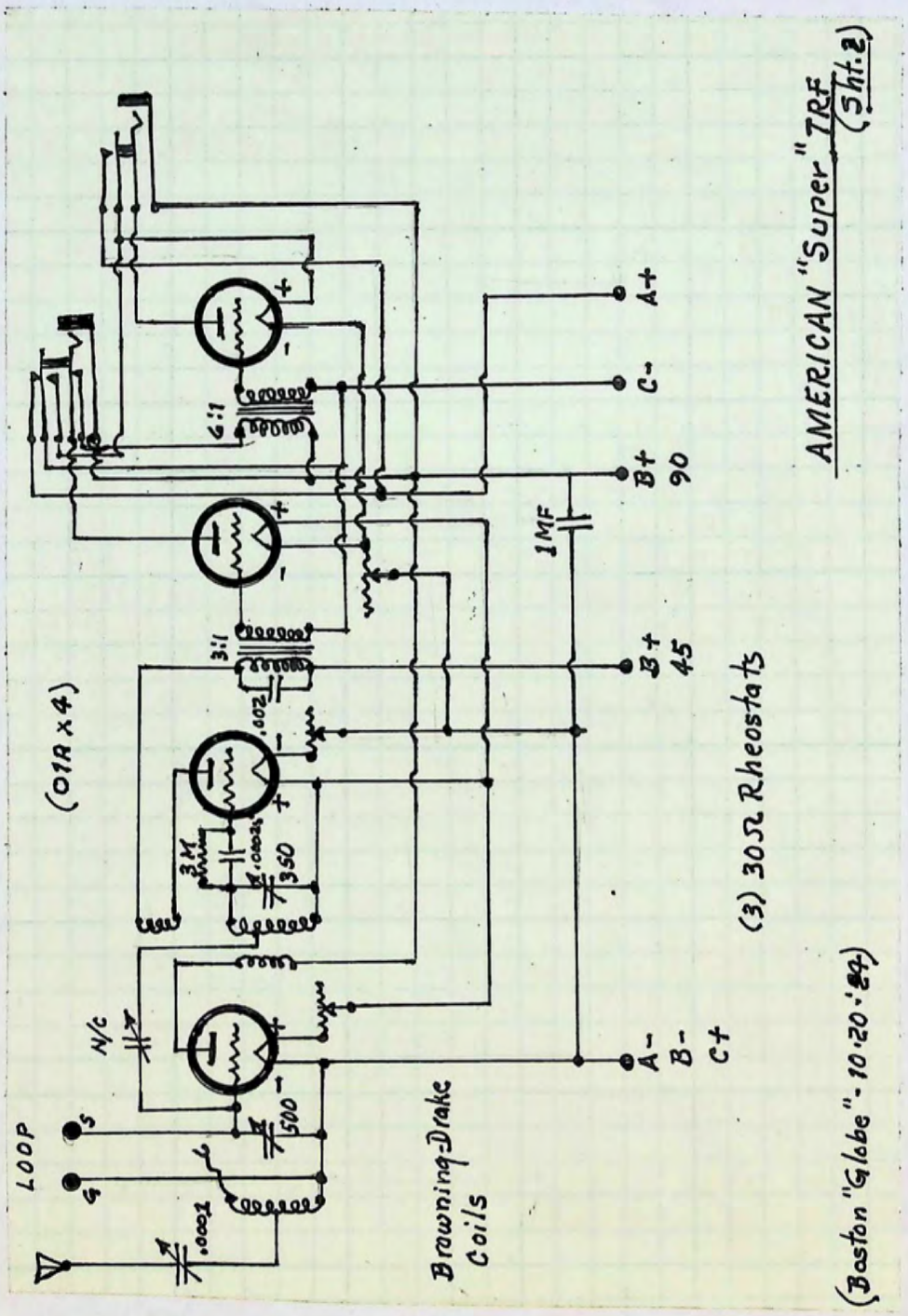
BOSTON "GLOBE" AMERICAN SUPER, 1923;Sht. 1



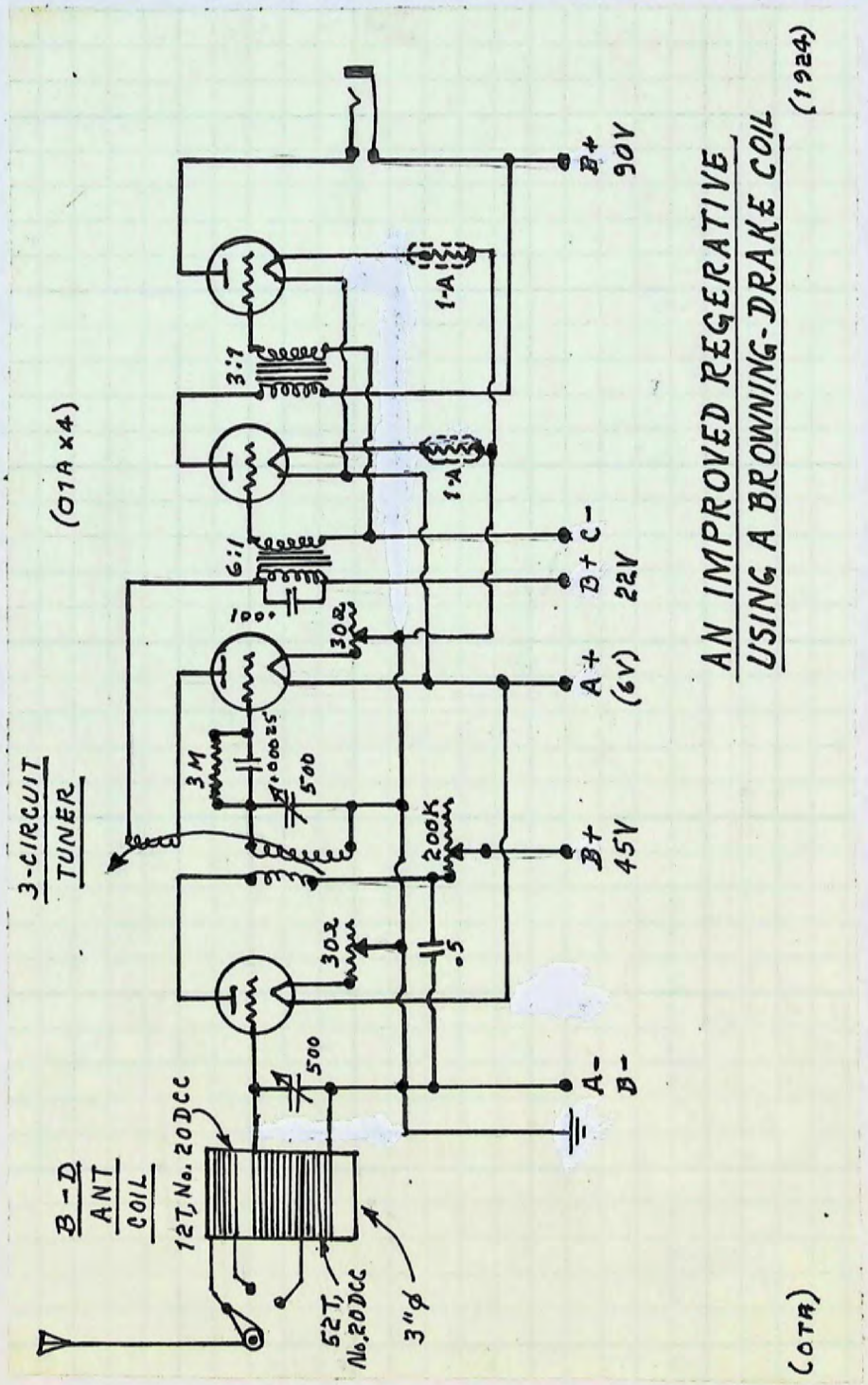


(BOSTON "Globe" ~ 10.20.1924.) (Sht. 1)

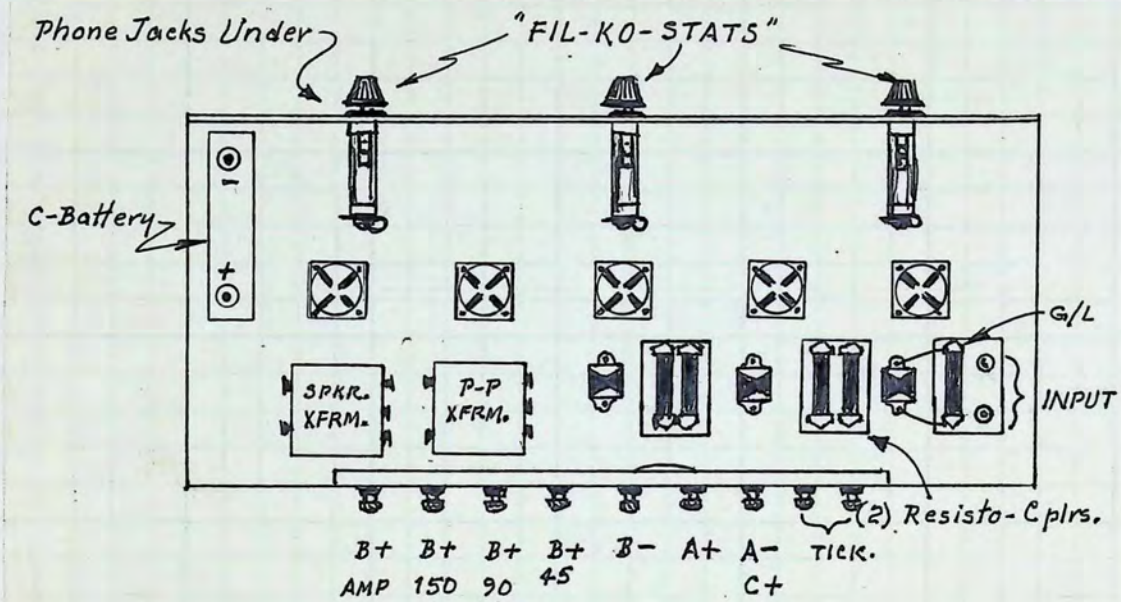
BOSTON "GLOBE" AMERICAN SUPER, 1923: Sht. 2

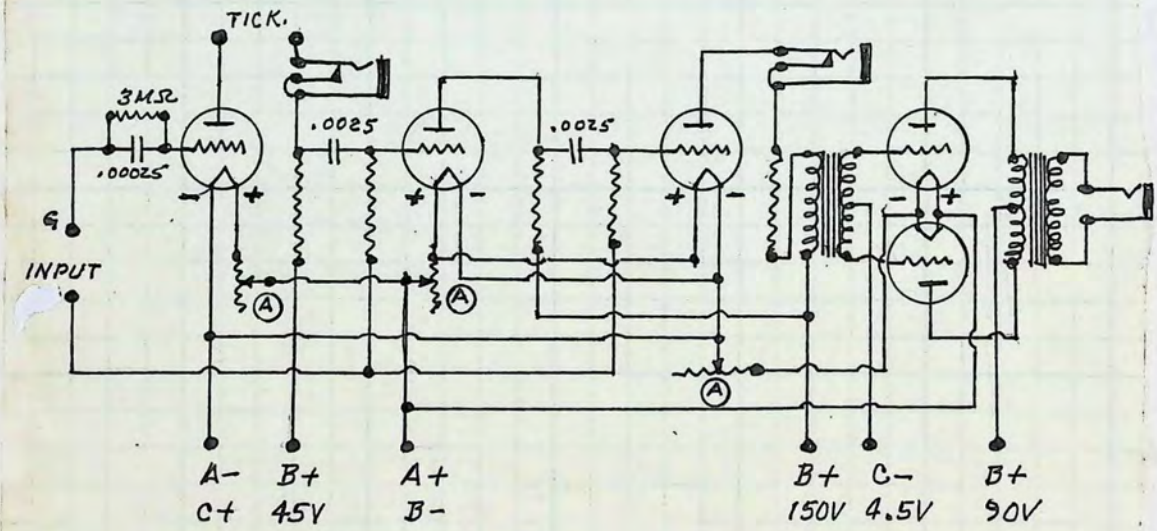


AN IMPROVED REGENERATIVE USING B-D COILS, 1924



"WIRELESS AGE" R-C AUDIO AMPLIFIER, 1924





(A) = (3) "FIL-KO-STATS" (Variable Tubular Resistors.)

(WA-24)

LIBERTY "D-K 3" B.C. RECEIVER, 1924; Sht.1

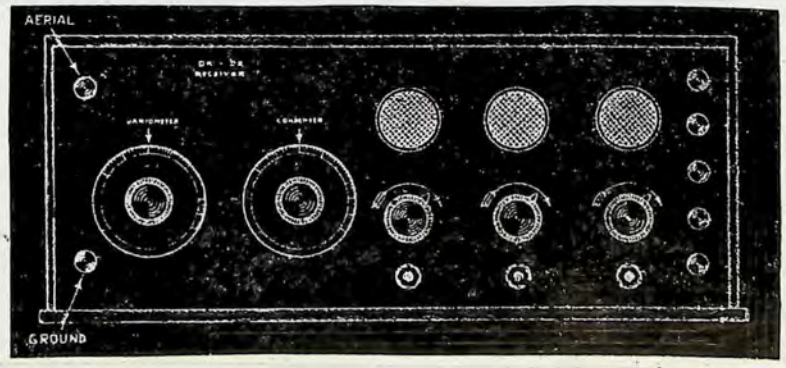
Liberty Radio Company and Liberty Transformer Company, both of Chicago, are frequently confused by hobbyists. The latter had gotten its experience by manufacturing items for the electrical engineering fraternity, and like other transformer manufacturers of the period, decided to get into the Radio Game. Others would be Scott, Acme, Samson, Rauland, Klentz, Thordarson, etc.

Liberty Radio was a modest chain-store operation, and like others shops would issue circuit diagrams for the home-constructor, for free; the idea being that the home-constructor would buy his parts from one of the Liberty Stores.They would buy up job-lots of rejected parts from major manufacturers, like as not, and this, too, was a common and legitimate practice among early mail-order houses. This also accounts for why you will find at swap-meets items which are identical to many major brands, but without any identifying markings at all.

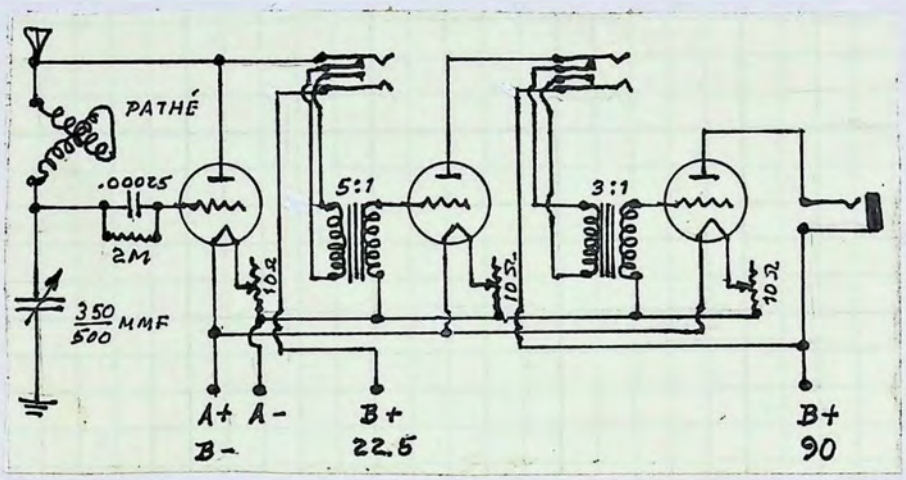
A lot of the in-house circuits were printed by the Radio Builders Publishing Company, which should not be confused with the Radio Publishing Company, which was the parent of Citizens' Radio Call Book.

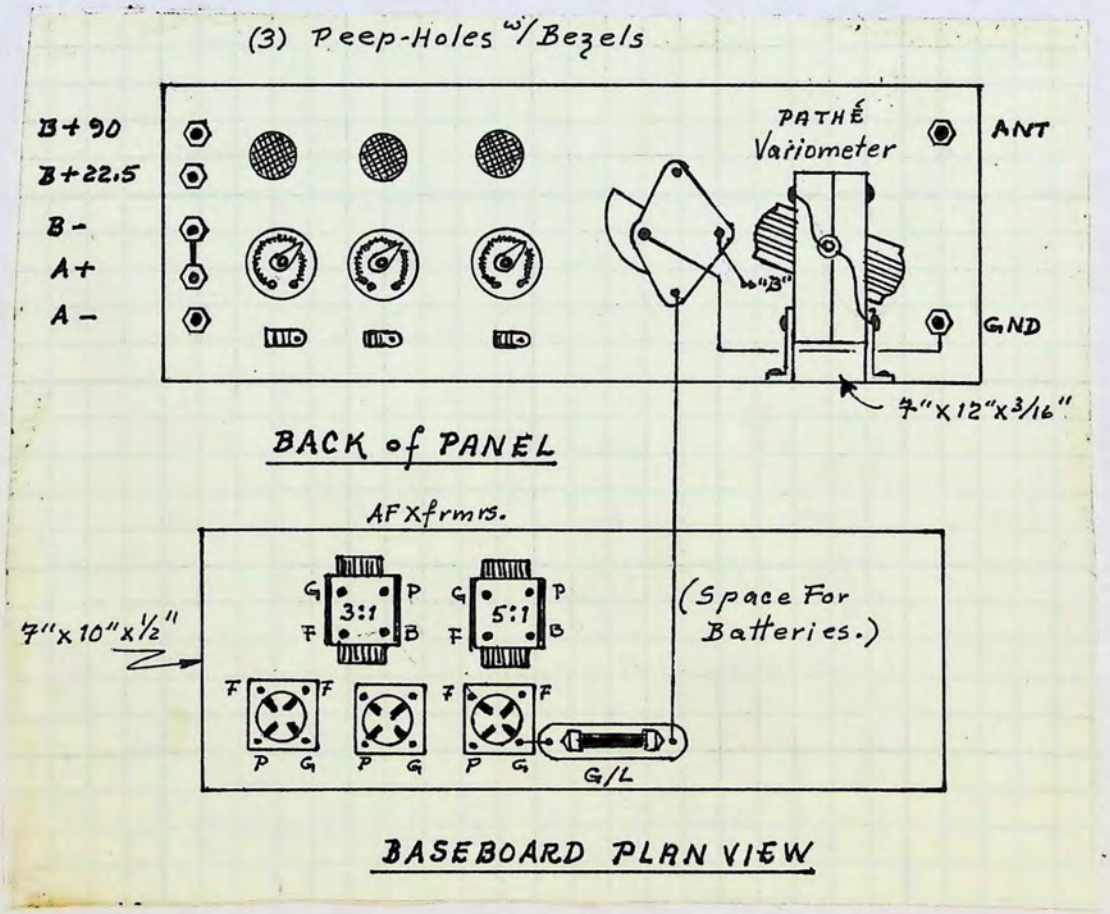
From among the dozens of "orphan" circuits distributed by Radio Builders Publishing Company, I have selected the D-K 3 regenerative circuit offered by Liberty Radio in 1924. It may be considered as atypical of its genre and the period. The French Pathé variometer was neatly employed, and was, in fact, the "heart" of the circuit. The rest of the circuit was conventional.

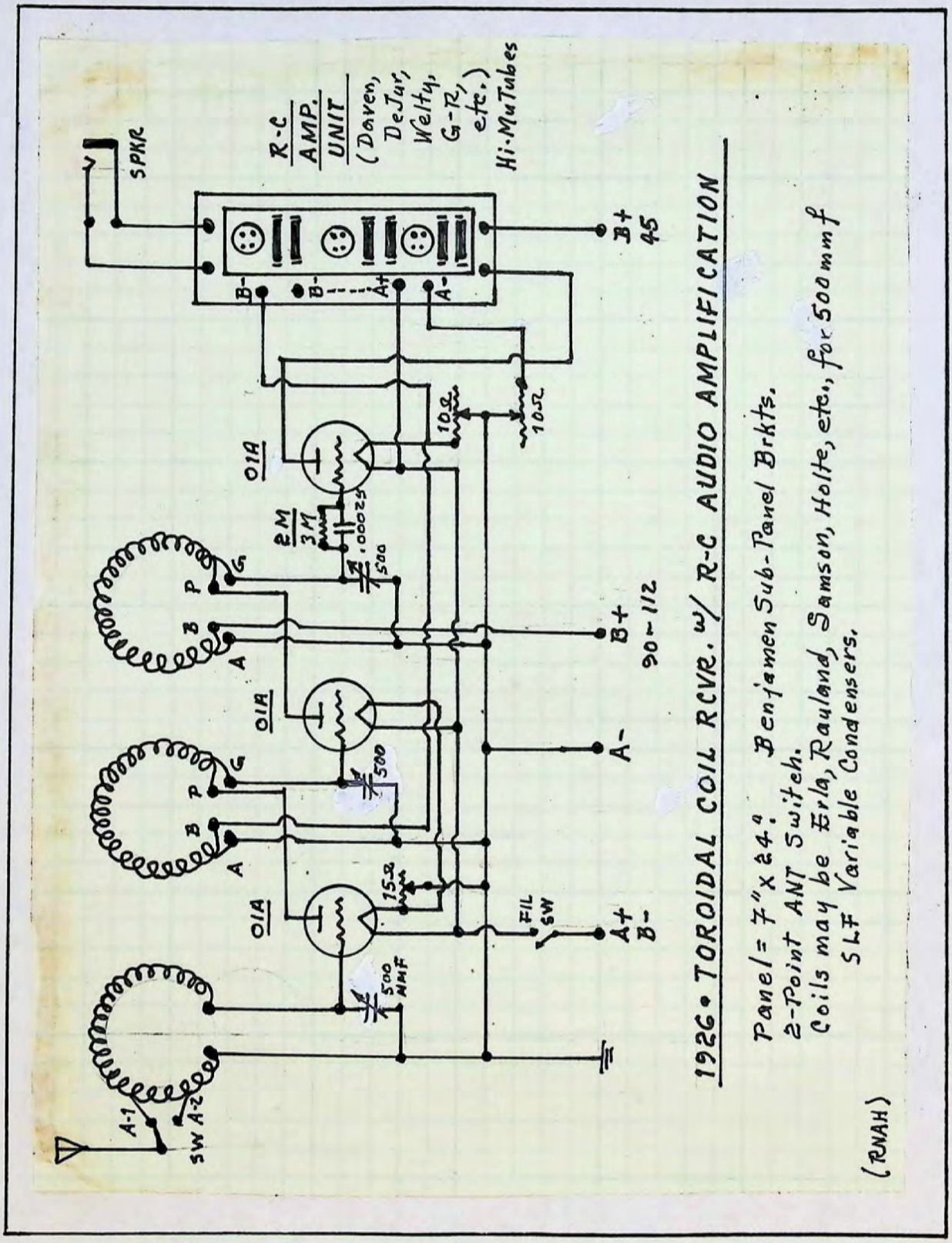
The Liberty Transformer Company also got into the game by offering a conventional TRF, at $100, in 1926, but did not endure.



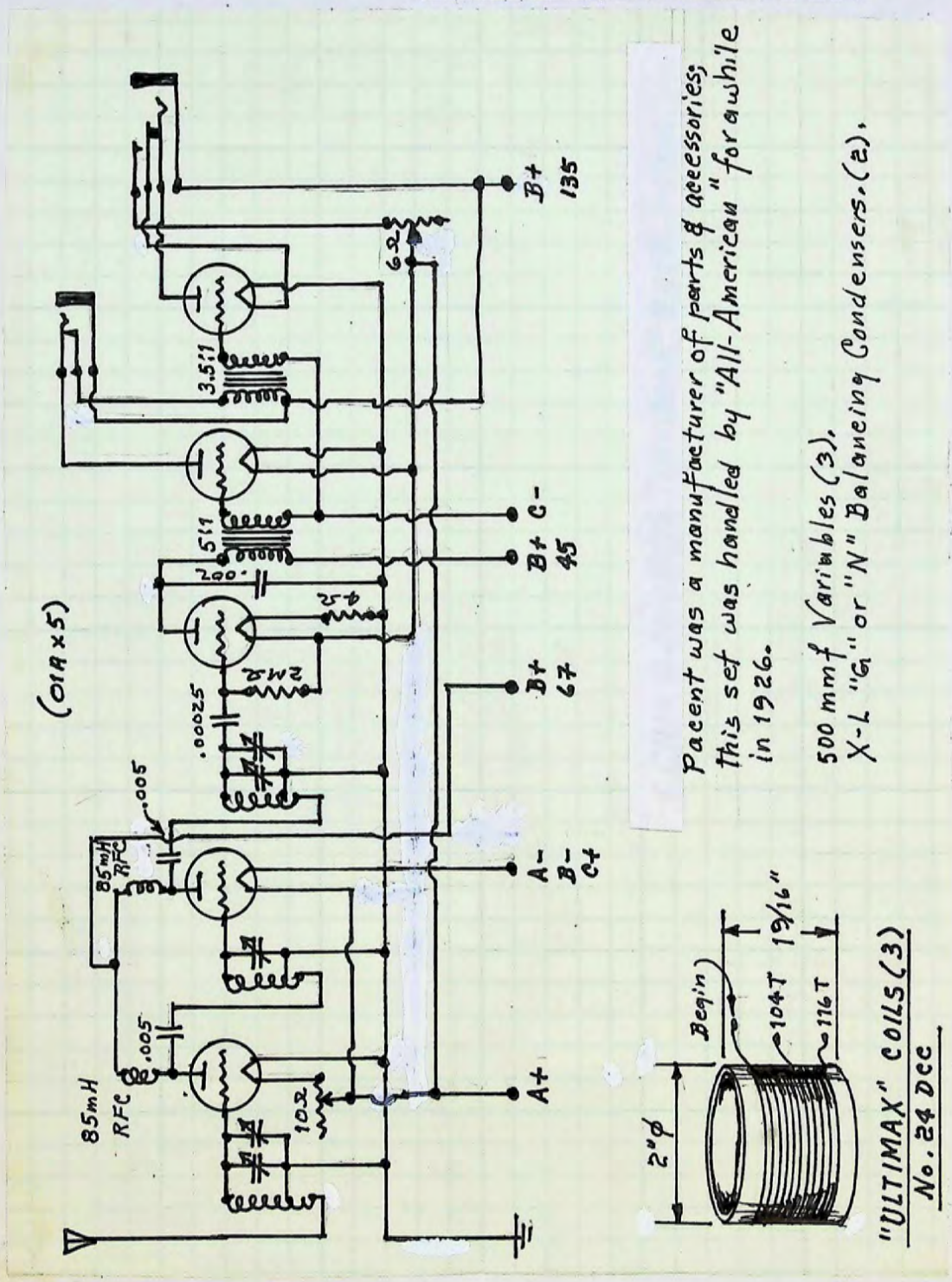
LIBERTY "D-K 3" B.C. RECEIVER; Sht. 2





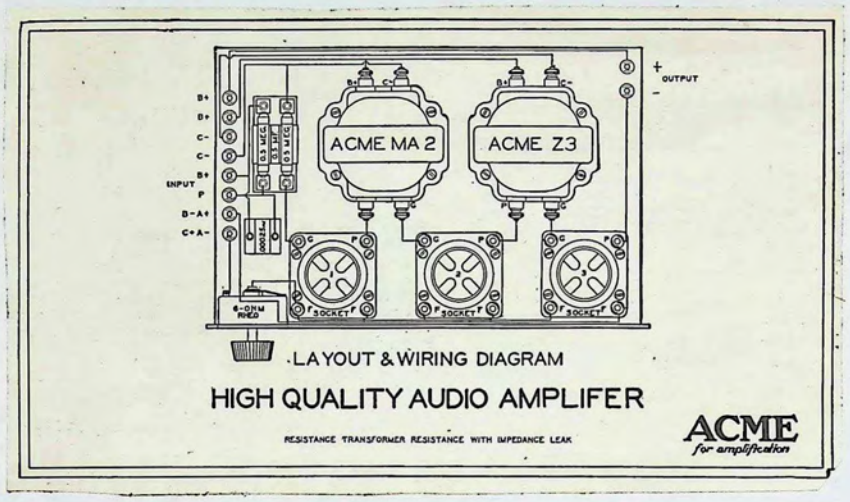

SPKR
R-C AMP. UNIT (Daven, DeJur, Welty, G-R, etc.) Hi-Mu Tubes
B-
B-
A+
A-
B+ 45
10Ω
10Ω
01A
2M
3M
.00025
500
G
P
B
A
01A
500
G
P
B
A
01A
15Ω
500 MMF
FIL SW
A+
B-
B+ 90-112
A-
A-1
SW A-2
1926 • TOROIDAL COIL RCVR. w/ R-C AUDIO AMPLIFICATION
Panel = 7" x 24".
2-Point ANT Switch.
Coils may be Erla, Rauland, Samson, Holte, etc., for 500 mmf SLF Variable Condensers.
Benjamen Sub-Panel Brkts.
(RNAH)

PACENT's "ULTIMAX" TRF, 1926



Pacent was a manufacturer of parts & accessories; this set was handled by "All-American" for a while in 1926.

500 mmf Variables (3).
X-L "G" or "N" Balancing Condensers. (2).



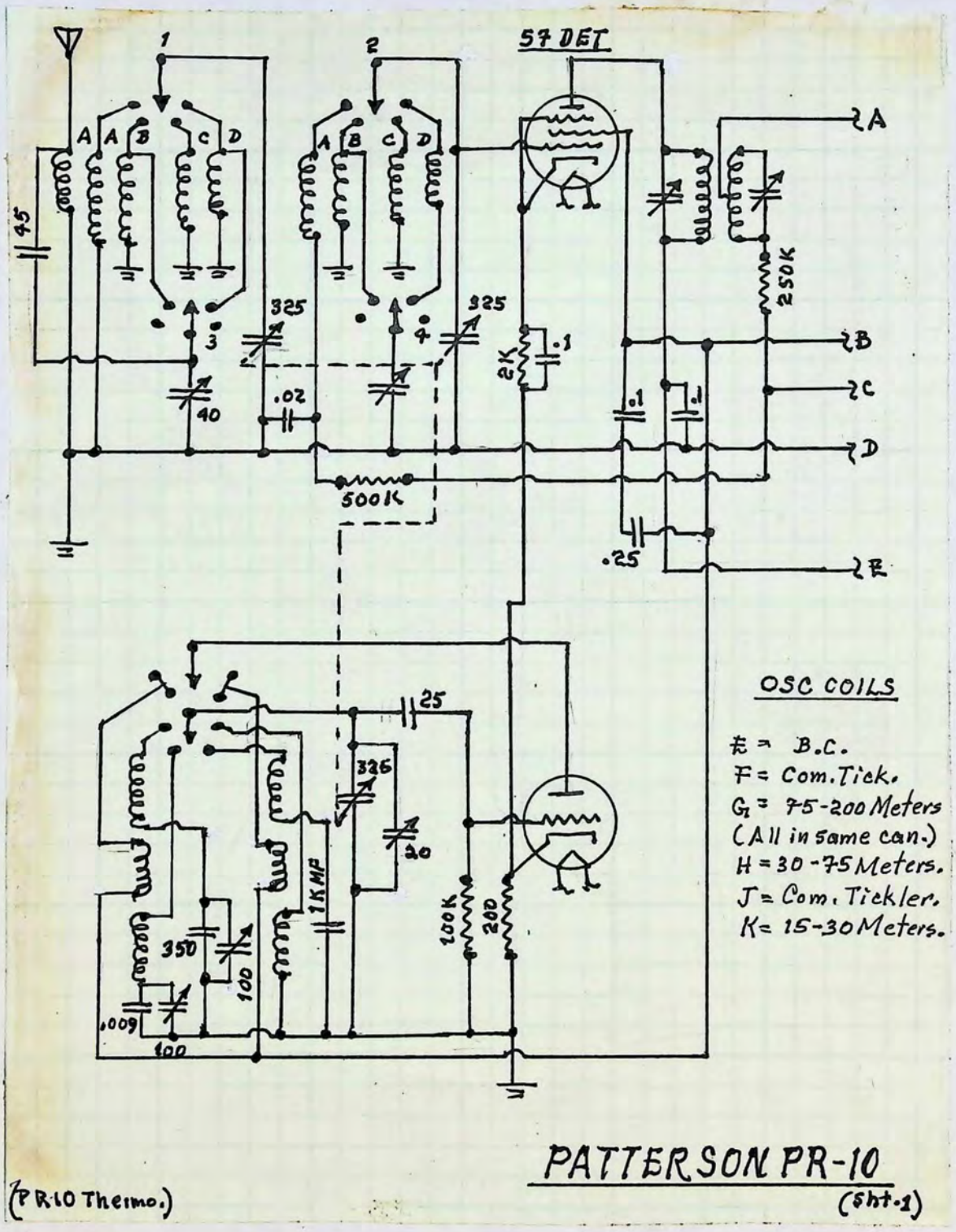
LAYOUT & WIRING DIAGRAM

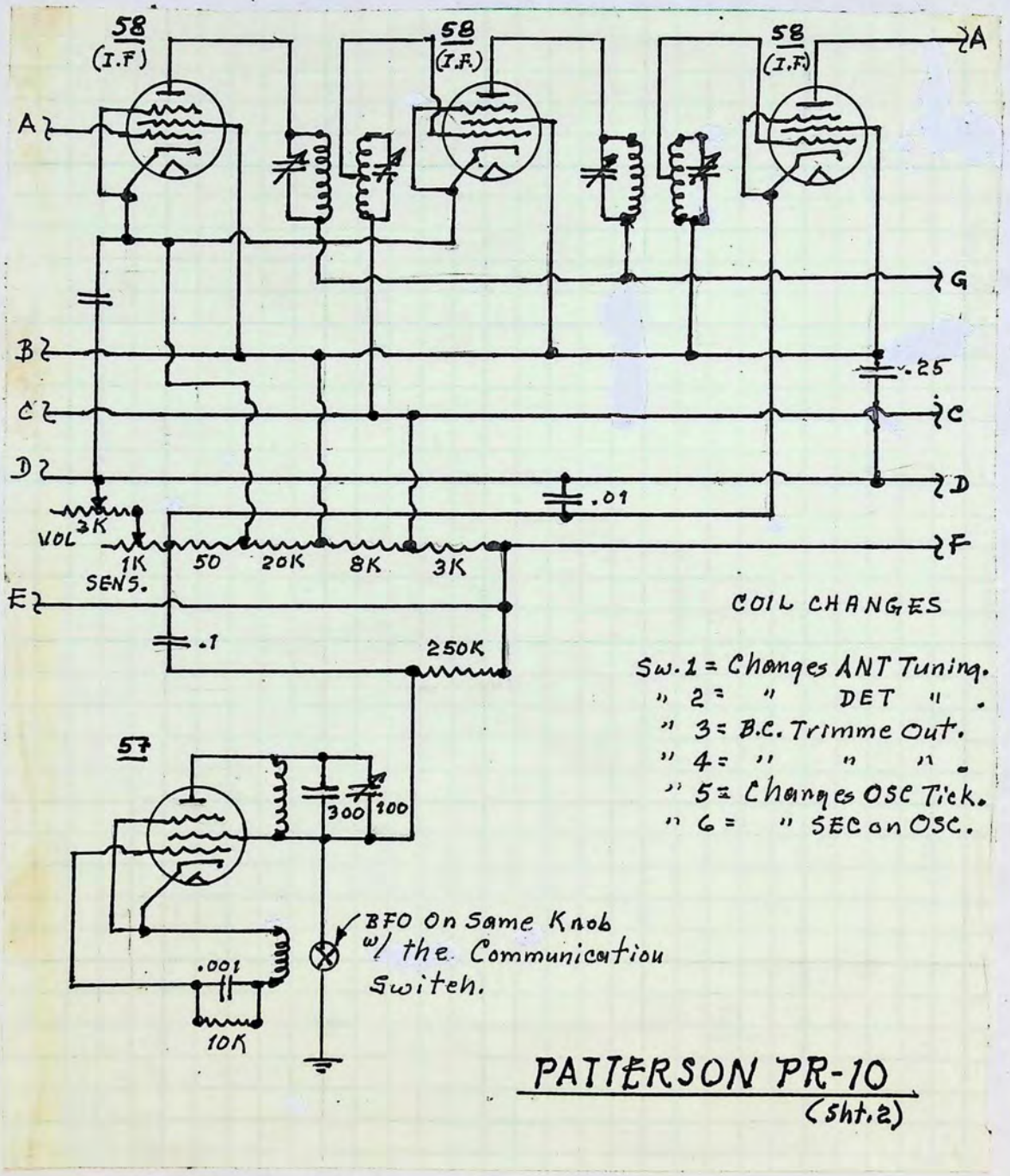
HIGH QUALITY AUDIO AMPLIFER

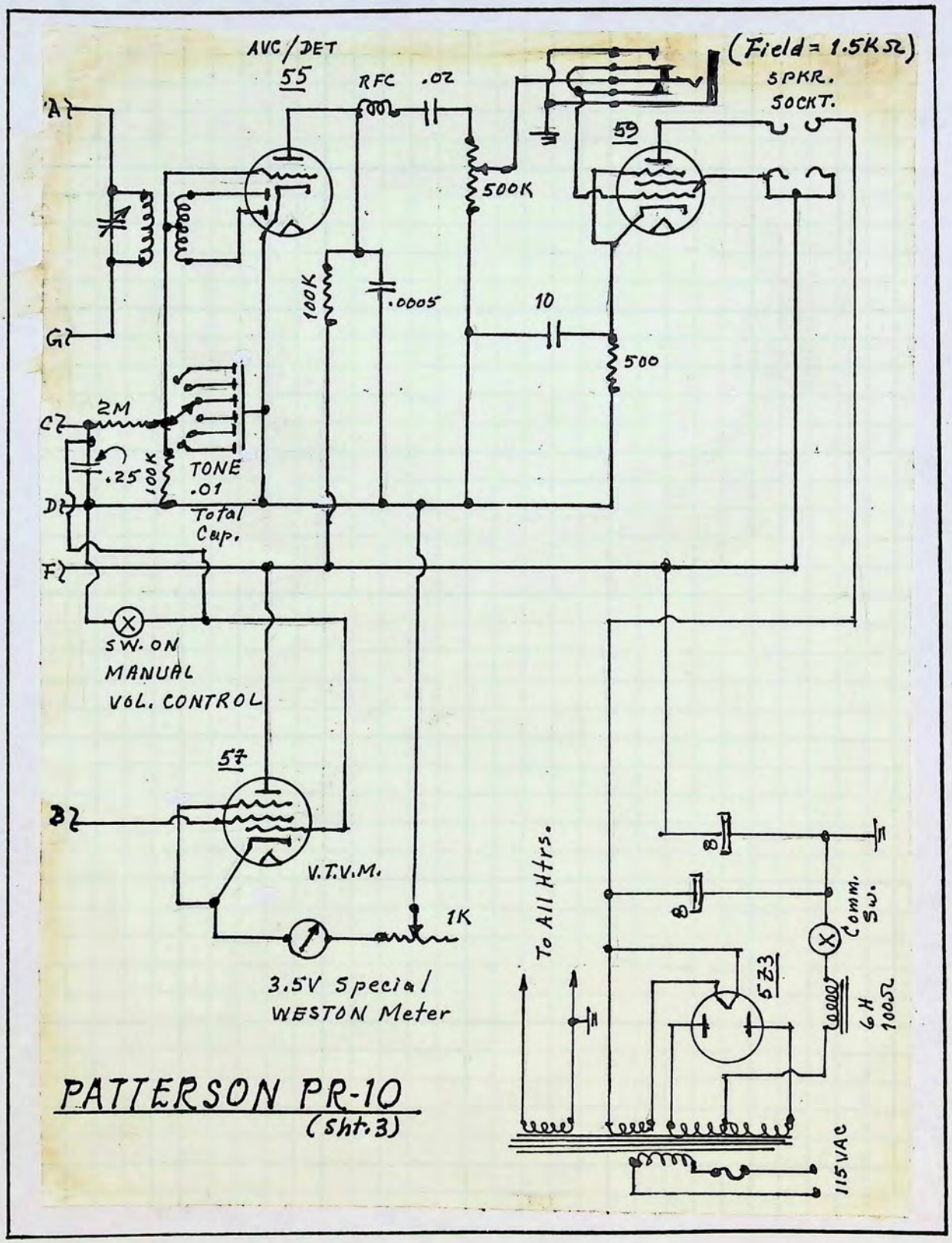
RESISTANCE TRANSFORMER RESISTANCE WITH IMPEDANCE LEAK

ACME
for amplification

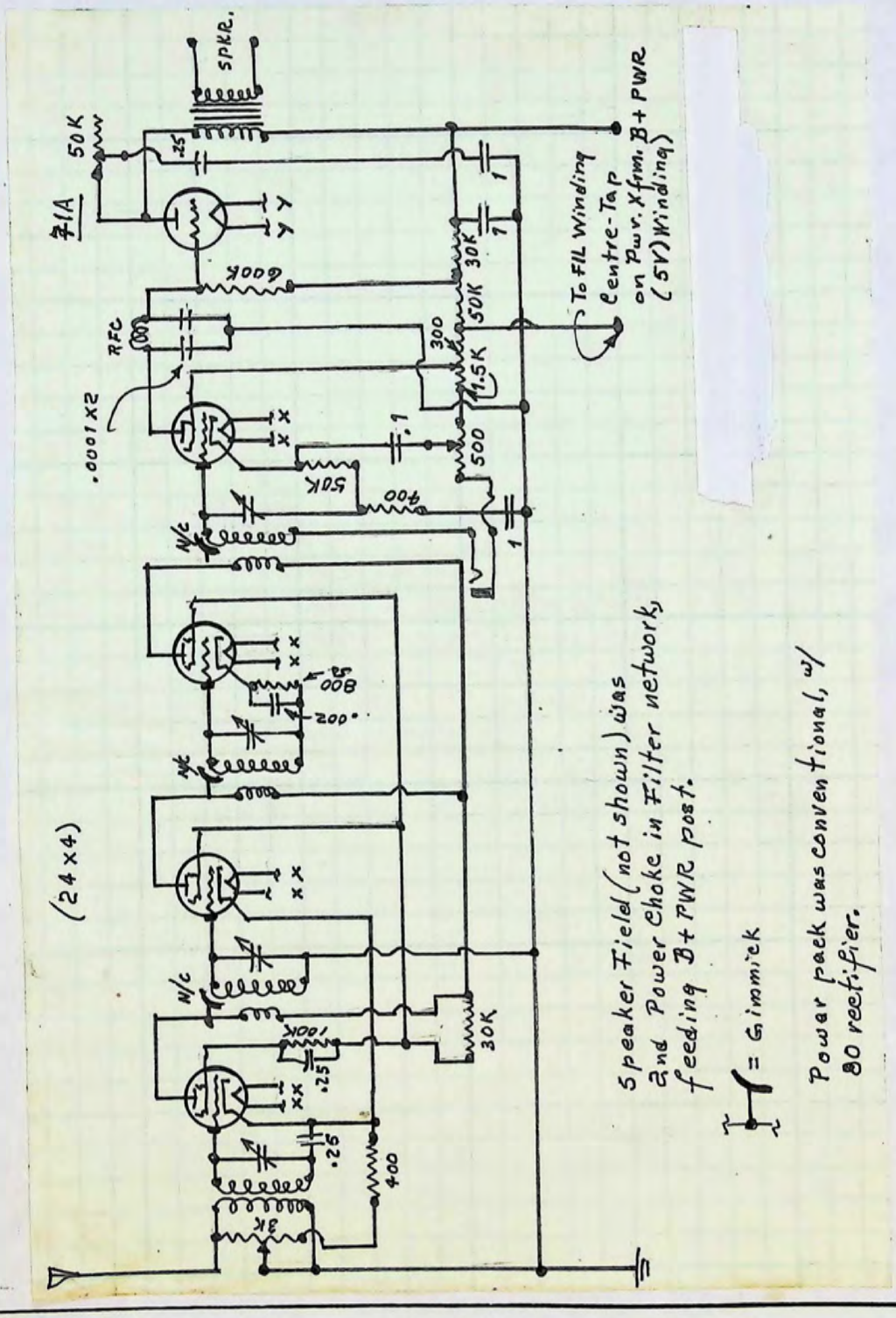
Vol IV

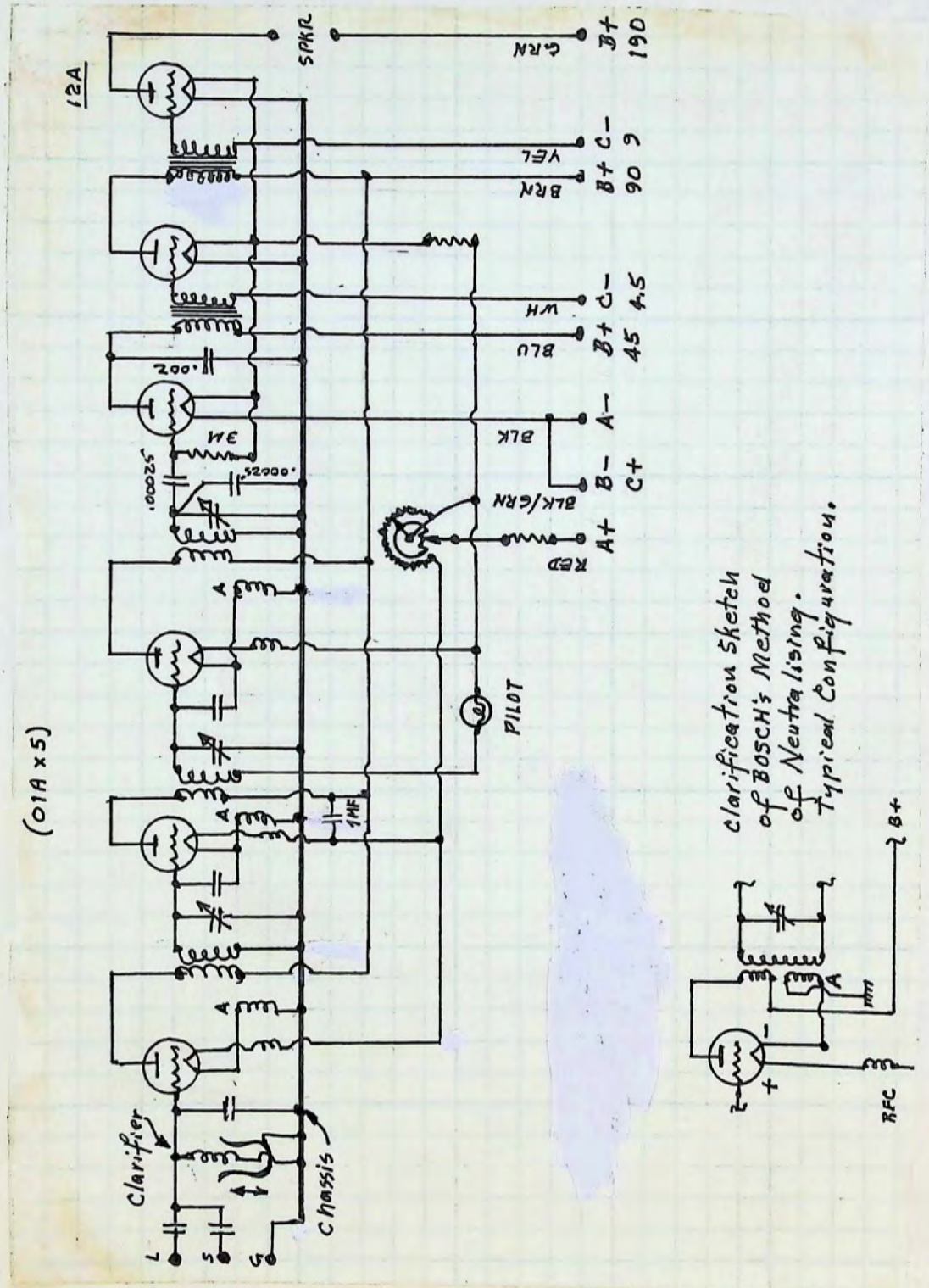

57 DET
1
2
3
4
A
B
C
D
E
45
325
40
.02
500K
2K
.1
250K
.25
25
326
20
1KMF
100K
200
350
100
.009
OSC COILS
E = B.C.
F = Com. Tick.
G = 75-200 Meters
(All in same can.)
H = 30-75 Meters.
J = Com. Tickler.
K = 15-30 Meters.
PATTERSON PR-10
(PR-10 Thermo.)
(Sht. 1)

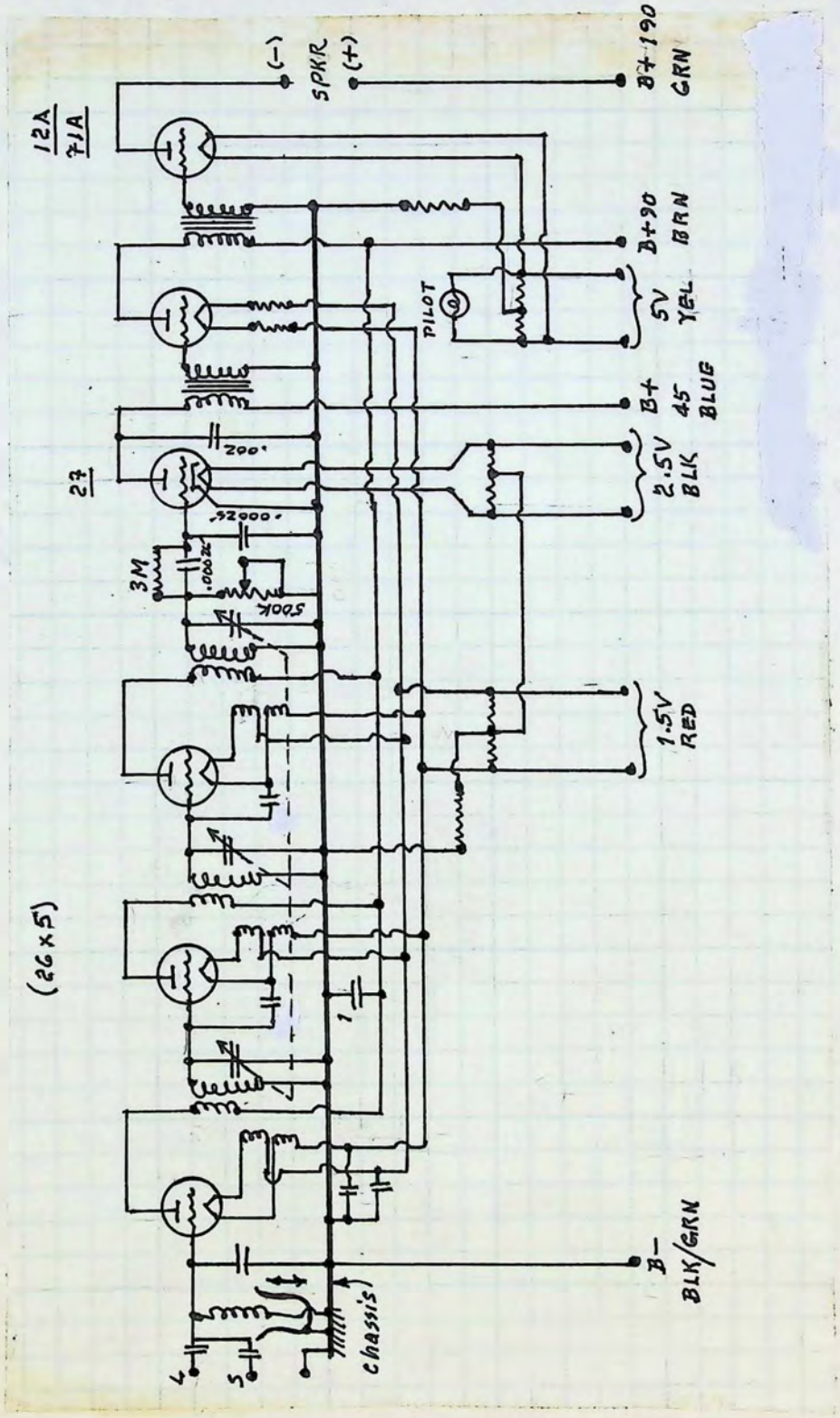

58
(I.F)
58
(I.F.)
58
(I.F)
A
A
G
B
.25
C
C
D
D
.01
3K
VOL
1K
SENS.
50
20K
8K
3K
F
E
.1
250K
COIL CHANGES
Sw. 1 = Changes ANT Tuning.
" 2 = " DET " .
" 3 = B.C. Trimme Out.
" 4 = " " " .
" 5 = Changes OSC Tick.
" 6 = " SEC on OSC.
57
300
100
BFO On Same Knob
w/ the Communication
Switch.
.001
10K
PATTERSON PR-10
(sht. 2)


AVC/DET
55
RFC
.02
(Field = 1.5KΩ)
SPKR.
SOCKT.
59
500K
100K
.0005
10
500
A
G
C
D
F
B
2M
.25
100K
TONE
.01
Total
Cap.
SW. ON
MANUAL
VOL. CONTROL
57
V.T.V.M.
1K
3.5V Special
WESTON Meter
To All Htrs.
8
8
Comm.
Sw.
5Z3
6H
100Ω
115VAC
PATTERSON PR-10
(Sht. 3)

TRAV-LER Model C, 1929

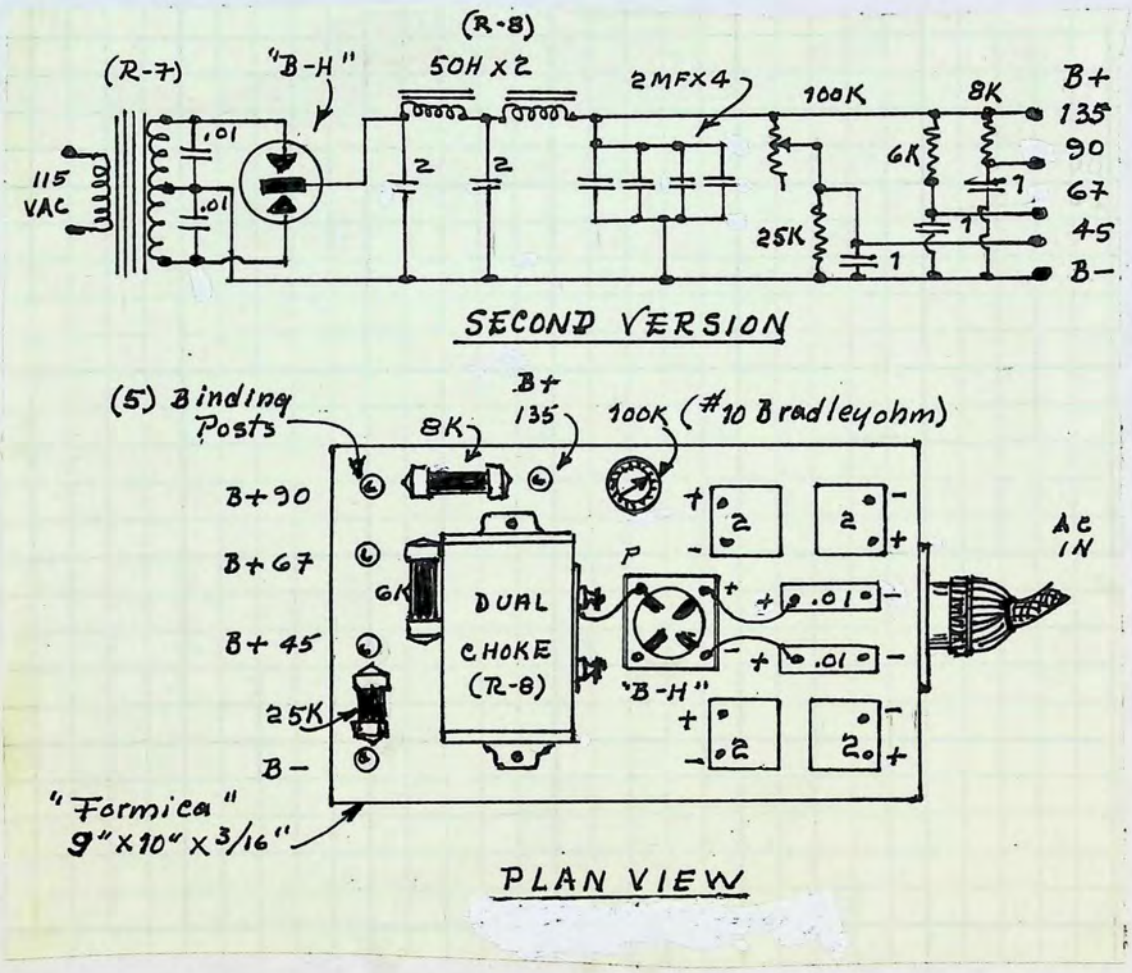



(01A x 5)
12A
SPKR
GRN
B+ 190
YEL
B+ C- 90 9
BRN
WH
B+ C- 45 4.5
BLU
A- C+
BLK
B- A+
BLK/GRN
RED
PILOT
Clarifier
Chassis
L
S
G
.200
.00025
3M
.52000
1MF
Clarification Sketch of BOSCH's Method of Neutralising. Typical Configuration.
B+
RFC
BOSCH MODELS 66, 76, 76L; BATTERY MODELS CALLED "CRUISER"



BOSCH MODELS 66L, 96, 116. 136(AC)

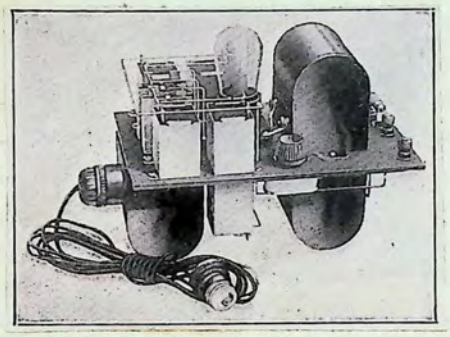
RAULAND "ALL-AMERICAN" B-SUPPLY, 1926: TWO VERSIONS



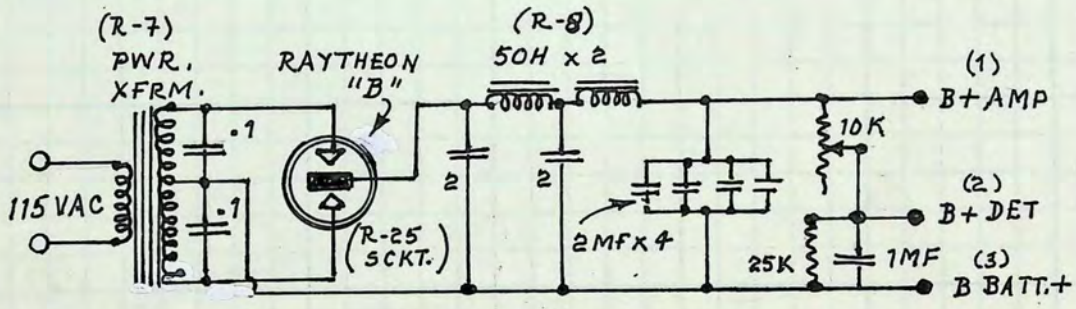
AVAILABLE FACTORY-WIRED IN METAL CABINET 9 X 10 X 7 FOR $37.50 EAST OF THE ROCKIES.

All-Am. B-Power Supply, 1927
p. 130

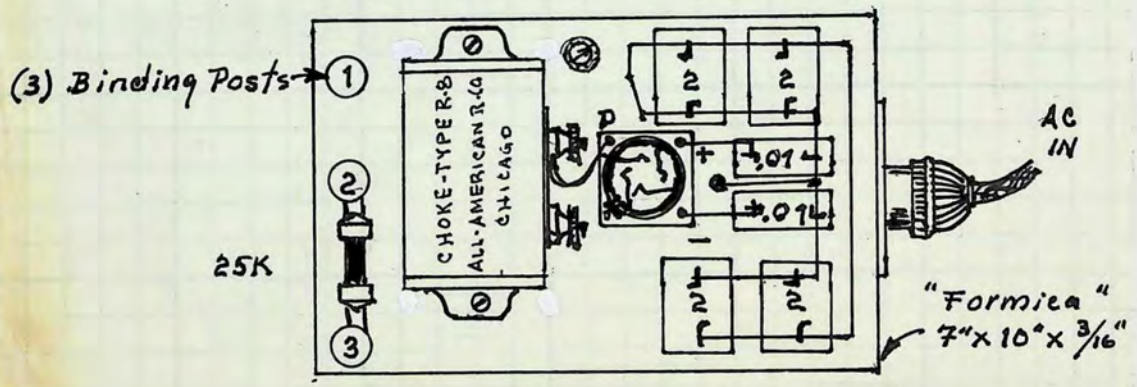
RAULAND "ALL-AMERICAN B-SUPPLY, 1926: TWO VERSIONS



PARENTHETICAL NOS, ARE RAULAND ALL-AMERICAN NOS.
THIS WAS ESSENTIALLY A COPY OF RAYTHEON'S FIRST COMMERCIAL B-ELIMINATOR OF THE YEAR BEFORE.
AN 8 MFD ELECTROLYTIC MAY BE SUBSTITUTED FOR THE 2 MF X 4.



FIRST VERSION



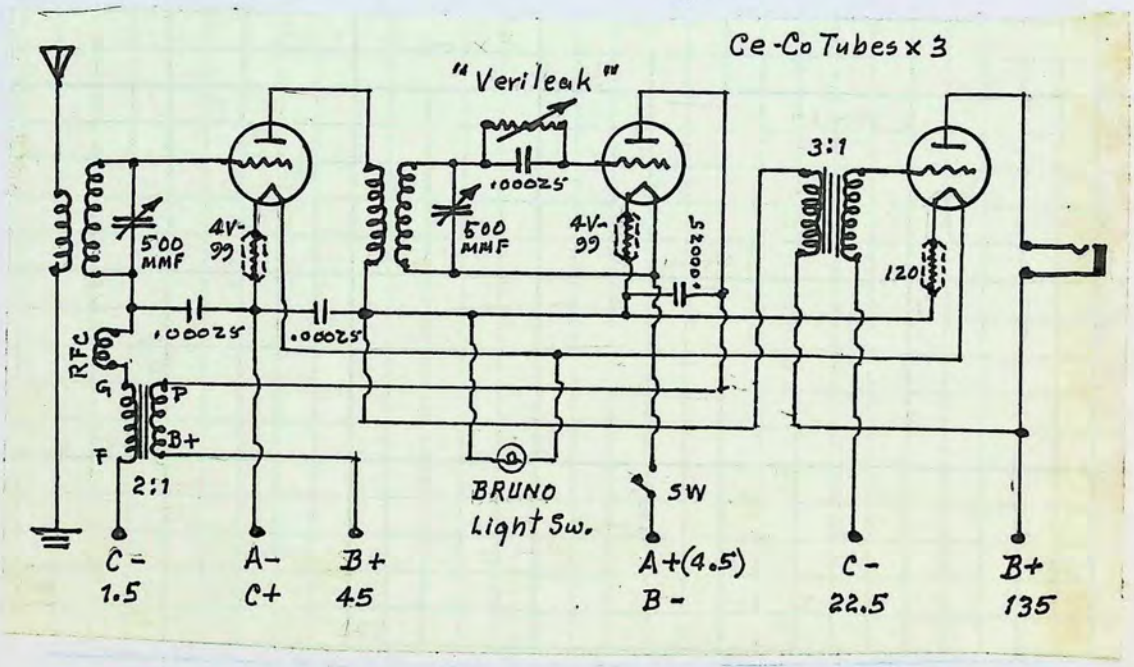
PLAN VIEW

(KIT - $17.50)

(RRRLG 6.26)

THE BEACON

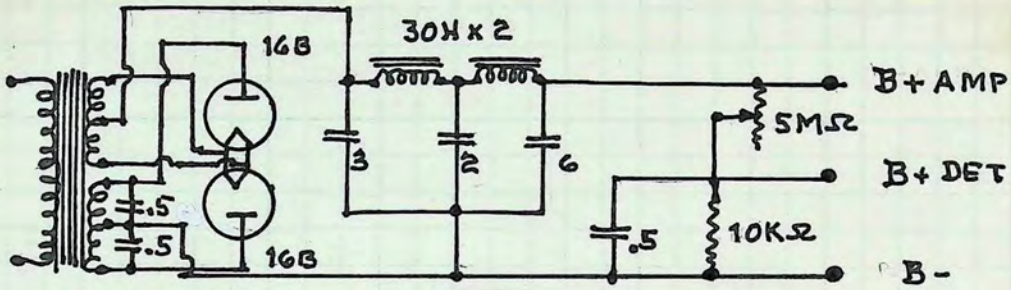
(A 3-TUBE REFLEX OF 1926)



Celeron Panel = 7" x 21".
Baseboard = 7" x 20".
Mar-Co Illuminated Dials (2).
Samson AF Xfrmrs.; 2:1/3:1.
Bruno 500 mmf Variables(2).
Bruno 99 RF Xfrmrs.

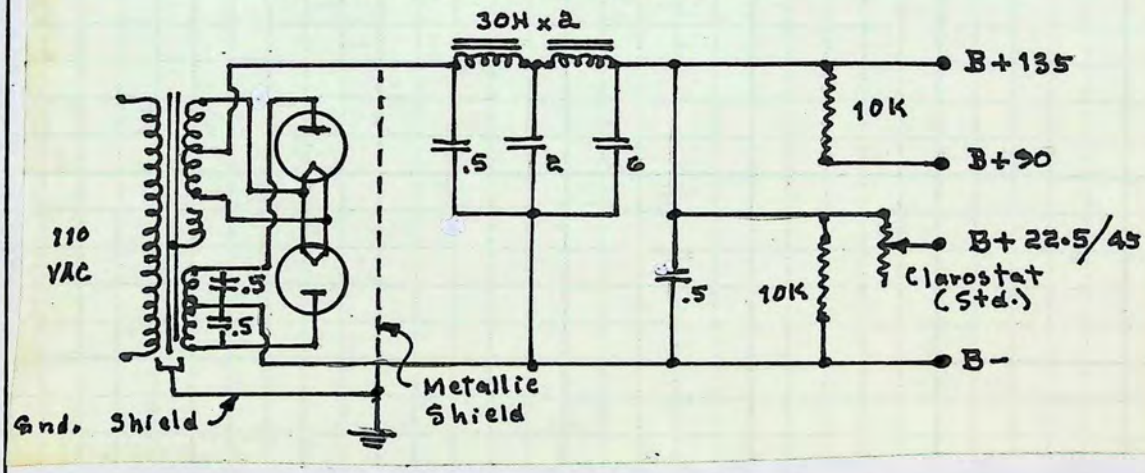
Eby Binding Posts (4).
Carter Short Jack.
Pacent X-Sockets (3).
Precision Coil RFC.
Amperites 4V-99(2);120.
Ce-Co X-99 Tubes (3).

"TECTRON" B-ELIMINATOR, 1926



ORIGINAL "TECTRON" B-ELIMINATOR ~ 1926

NOTE: This became the "Compact" Eliminator one year later, which is detailed below.



NOTES:

Original rectifier tubes were "Tectron" brand: 16Bs may be substituted.

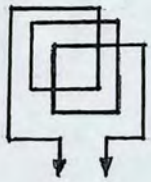
Tectron Radio Co., N.Y.C., offered the "Compact" unit for $35. Unit would pass 60 mA, up to 150 volts.

ON LOOPS & ANTENNAE

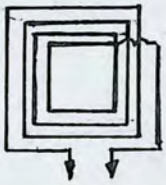
The rise of Radio in the Twenties turned very much on the loop. Many present-day hobbyists seem to believe that a loop is a loop is a loop. This isn't quite correct, and the following comments are offered as aguide to getting better (and original) results from whatever type of loop you have.

THE LOOP:

There were two distinct types of loops, known as the spiral and the pancake type, illustrated below.



Solenoid Type



Pancake Type

There were five fundamental types of broadcast receivers in the early days when the loop was in vogue, and each had its own peculiarities.

1. Non-Regenerative: including all types of crystal sets (not reflexes), and those circuits using no tickler feedback, capacity feedback, or RF amplification ahead of a non-regenerative DET.

2. Regeneration:including all reflex types, both inductive and capacitive feedback, and those sets which employed no RF amplification ahead of the DET.

3. T.R.F.: by far the greatest number of of different cominations, which included the neutralised, stabilised, reverse feedback, reflexed and regenerative RF circuits.

4. Super-Regenerative: under-developed for B.C. reception.

5. Super-Heterodyne: considered the premier of radios.

Loops CANNOT be used with every type of radio - the non-

regenerative set, for example, is useless with a loop. Reasonably good results may be gotten from a loop witha regenerative set, but is not recommended. On the other hand, the reflexed regenerative offers excellent results with the loop.

There was one general caution applicable to either type of loop, and that was to keep the loop away from the set, as excessive feedback takes place, and the tuning interacts with that of the loop, and uncontrollable oscillation will result.

Most any T.R.F. will work well with a loop, and the loop came into its own with the early super-hets: even though the super-het would work well with most any antenna, the antenna length had to be kept very short, which surprised many an early enthusiast, who was used to high-strung wires at least 100 feet long.

In as much as a loop, either type, will pick-up only about 3% to 5% of the energy that a good antenna can, too many modern hobbyists have dismissed use of the loop with their early sets. This suggests that they are simply too lazy to do their home-work.Good results from a loop by avoiding the following:

1. Placing the set near a steel structure.

2. Having the loop in the proximity of an antenna.

3. Radiation from a more powerful receiver.

4. Having a truly sensitive set.

The following data are given for various sizes of loops and the more common variable condensers:

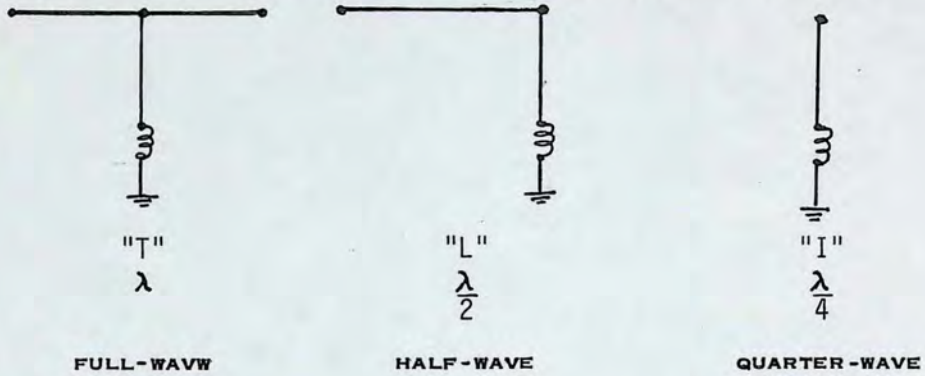
FRAME SIZE	VARIABLE		
	250mmf	350mmf	500mmf
	Number of Turns		
2-Feet Square	20	14	10
3-Feet Square	16	12	8
4-Feet Square	12	8	6

The average wire gauge used was No. 22, and the insulation was of no moment, as it could be cotton, silk, enamel.

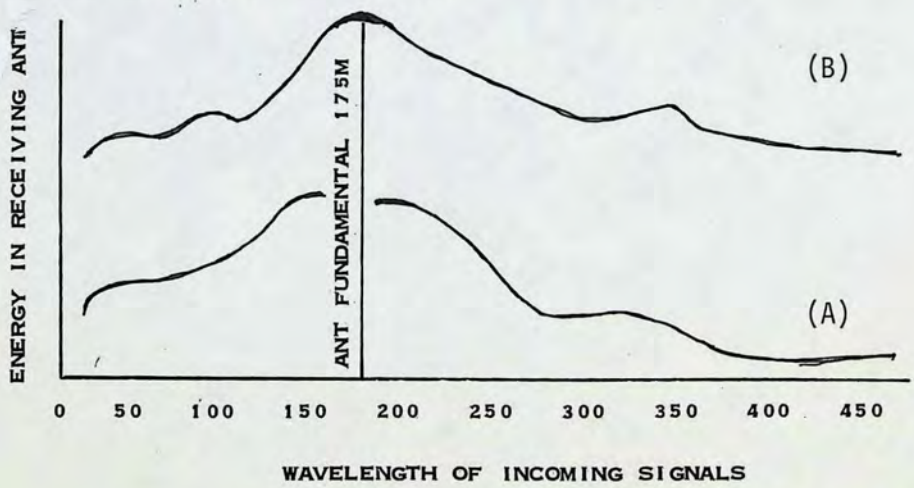
ANTENNAE:

The National Bureau of Standards defined an antenna as "*a system of suspended wires of any form, kept free from surrounding objects and carefully insulated therefrom, used for the reception or the transmission of radio-waves.*"

There were four types of antennae developed in the Twenties - the "T", the inverted "L", the vertical "I". and the pyramid. The most efficient antenna was, and is, the single wire inverted "L".



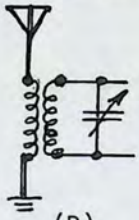
Describing antennae as Aperiodic and Semi-Aperiodic was much in vogue among radio-media writers, and the two terms seem to confuse some modern hobbyists. The terms are quite relevant to a given circuit. The following sketches depict both terms graphically, as well as curves showing the RELATIVE amount of energy that can be picked-up or collected by an Aperiodic antenna (A), and how much more energy can be collected if a receiver is coupled to it (B).



See over-leaf for graphic representation of (A) and (B), which are self-explanatory.

You can calculate an antenna for your exact requirements of desires with much more self-satisfaction that by simply going into a radio-shop (if they still exist) and buying a so-called ANT kit of a round of copper wire, insulators, and some hardware. The formula is straight forward and easy to apply.

(A)
Aperiodic

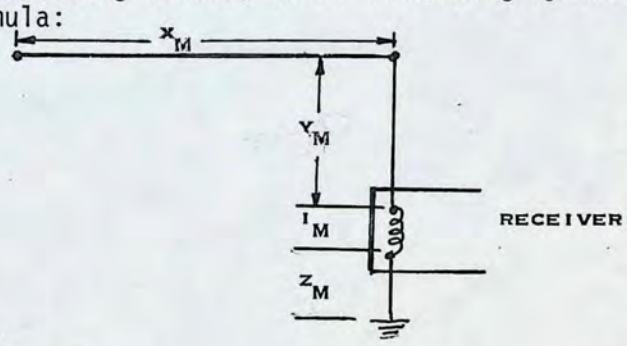


(B)
Semi-Aperiodic

The Formula:

$$\lambda = Xm + Ym + Zm + Im$$

As you can see in the following sketch, there is nothing mysterious about applying the formula:

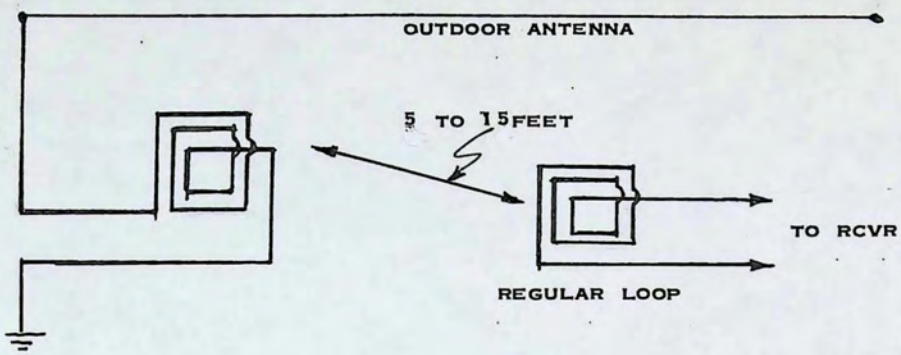


Im = Average 10 meters.

Since wave-length (λ) was always measured in meters, and the meter remains at 39.37 inches, the fundamental wave-length can be measured by dividing it by half (Xm ÷ 2), plus the mength of the lead-in (Ym), and the equivalent length of the few turns of wire which constitute the PRIMARY coil in the receiver (Im).

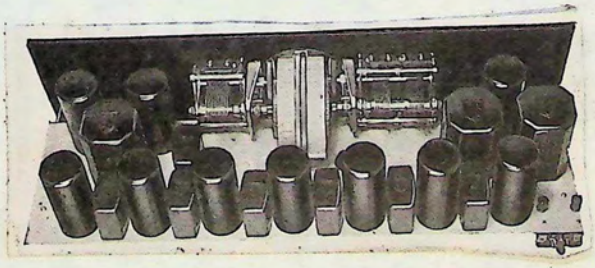
A so-called ideal antenna of the Twenties had 60 feet in its horizontal portion, 40 feet in the lead-in, and 15 feet for the ground connexion. It easily covered the B.C. range from 200 to 550 meters. There was, however, a "best" antenna set-up, much touted in our early media, which claimed the greatest DX and loudest volume, using a loop. An outdoor antenna was connected to a loop fastened to a wall, consisting of 10 turns of bell-wire on a 4-ft. frame. The other end of the loop was grounded.

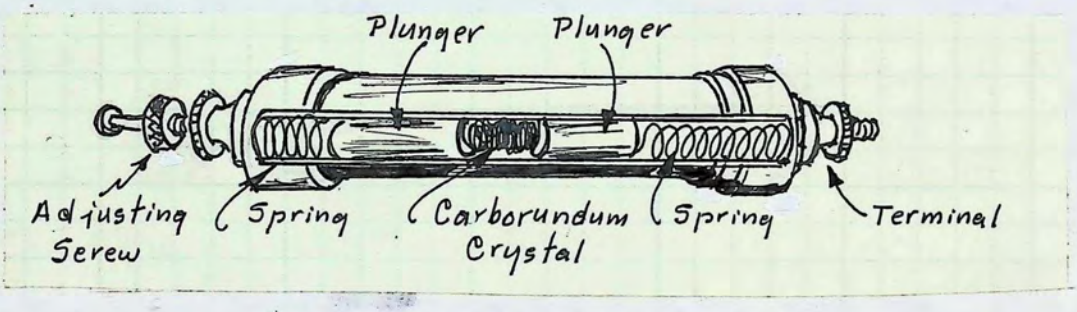
An ordinary loop was then connected to the receiver and was placed in inductive relationship with the outside antenna's loop, anywhere from five to fifteen feet. In this instance, the directional characteristics of the loop are obviated, but its sensitivity was enormously increased, especially for distance.



In conclusion, the use of either a loop or antenna, with the right kind of receiver, will give about the same results. A loop permits sharper tuning; the antenna will pull-in more energy from a greater distance, but tuning will be much broader than with a loop. It is chiefly a matter of personal preference. Myself, I still prefer the most elegant of all early loops - the BODINE "DeLuxe" loop.

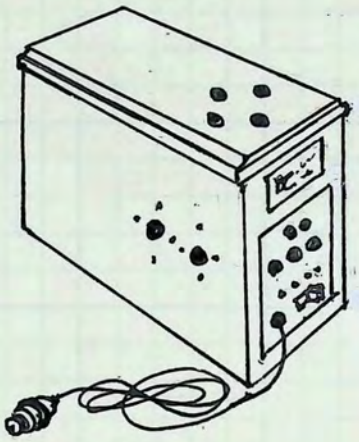
* * *
* *
*



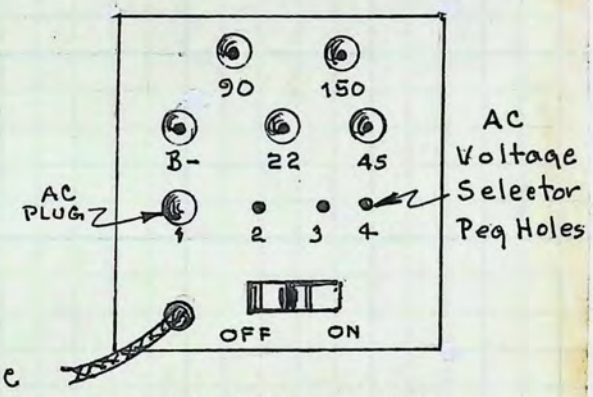


ANATOMY OF THE CARBORUNDUM XTAL.

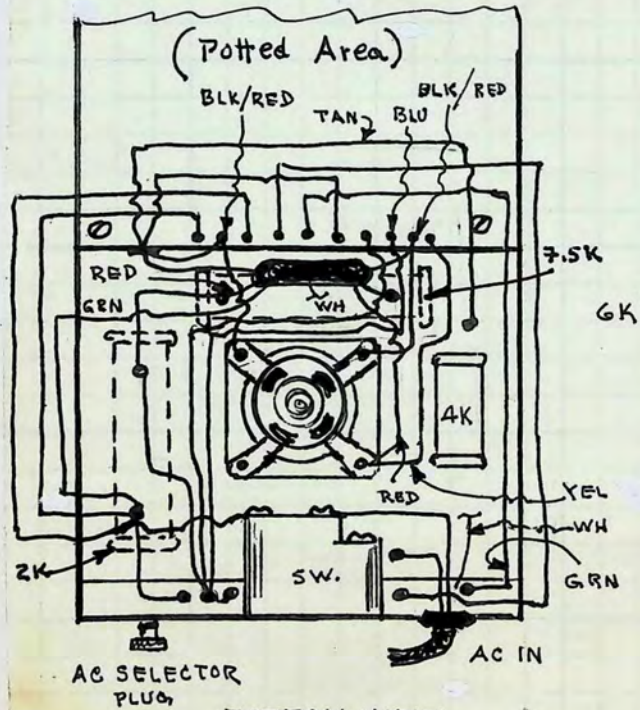
BREMER-TULLY B-POWER UNIT, 1925



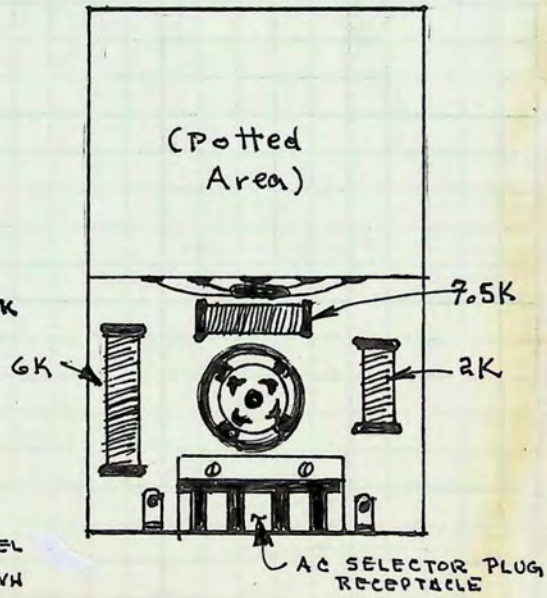
(Wood-Grained Metal Cabinet)



BAKELITE PANEL

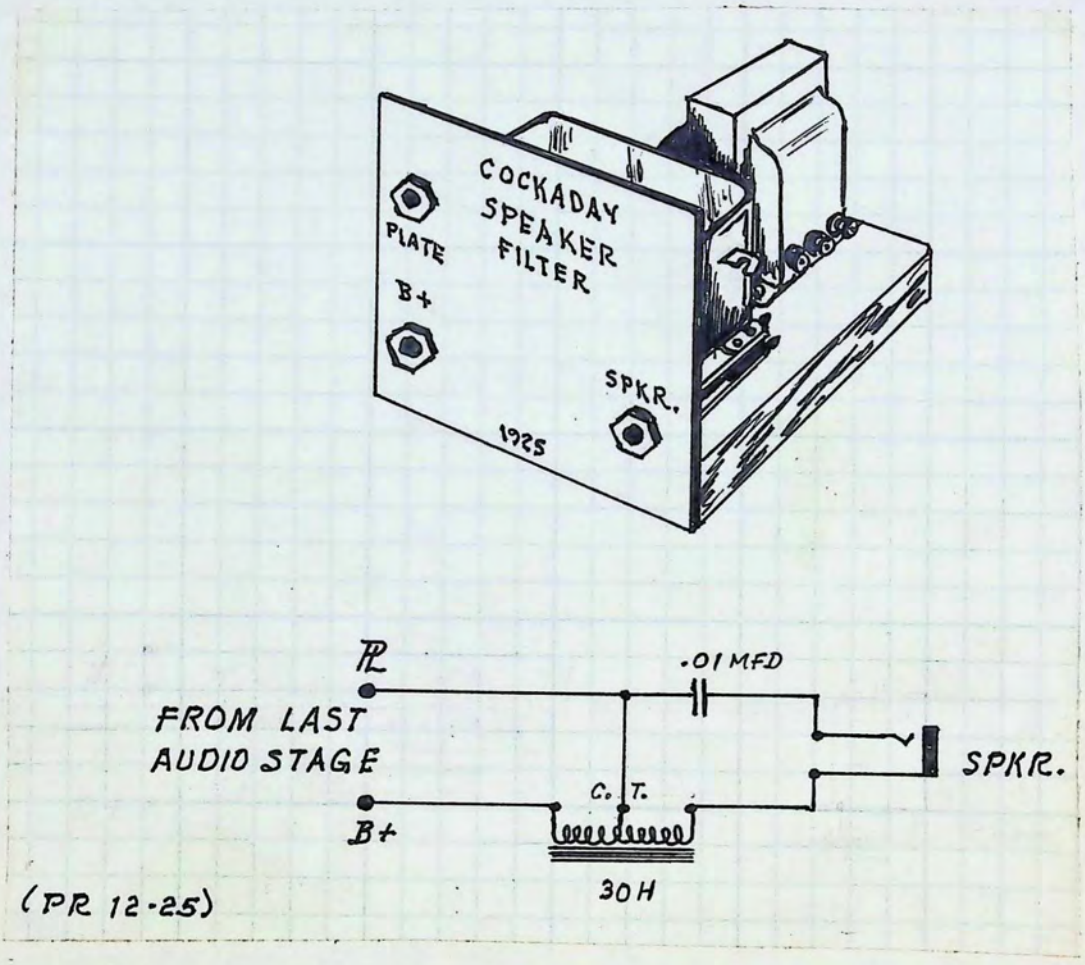


BOTTOM VIEW
(B-T Socket)



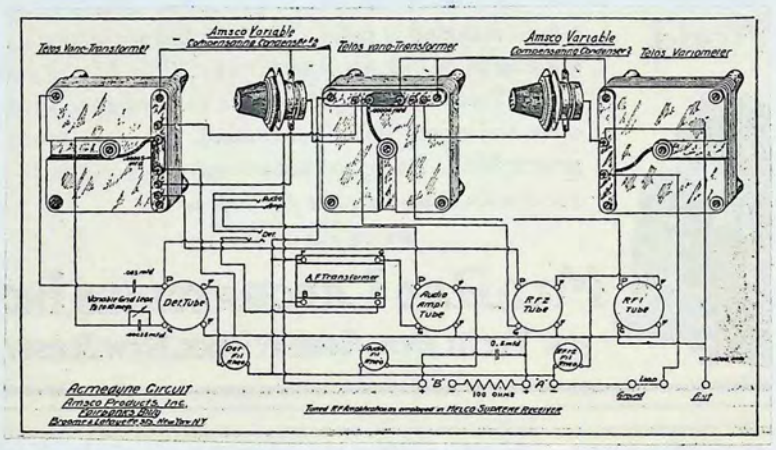
PLAN
("B-H" Rectifier)

COCKADAY SPEAKER FILTER, 1925

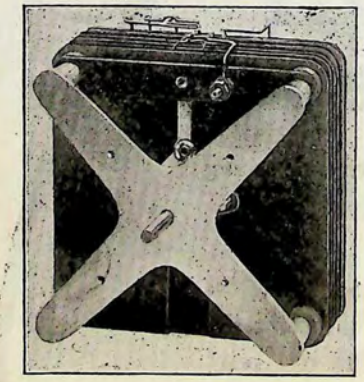


This filter followed the design concepts of others, such as Muter, Bremer-Tully, Daven, and all were more or less equally effective . This one is easy to build.

MELCO-SUPREME



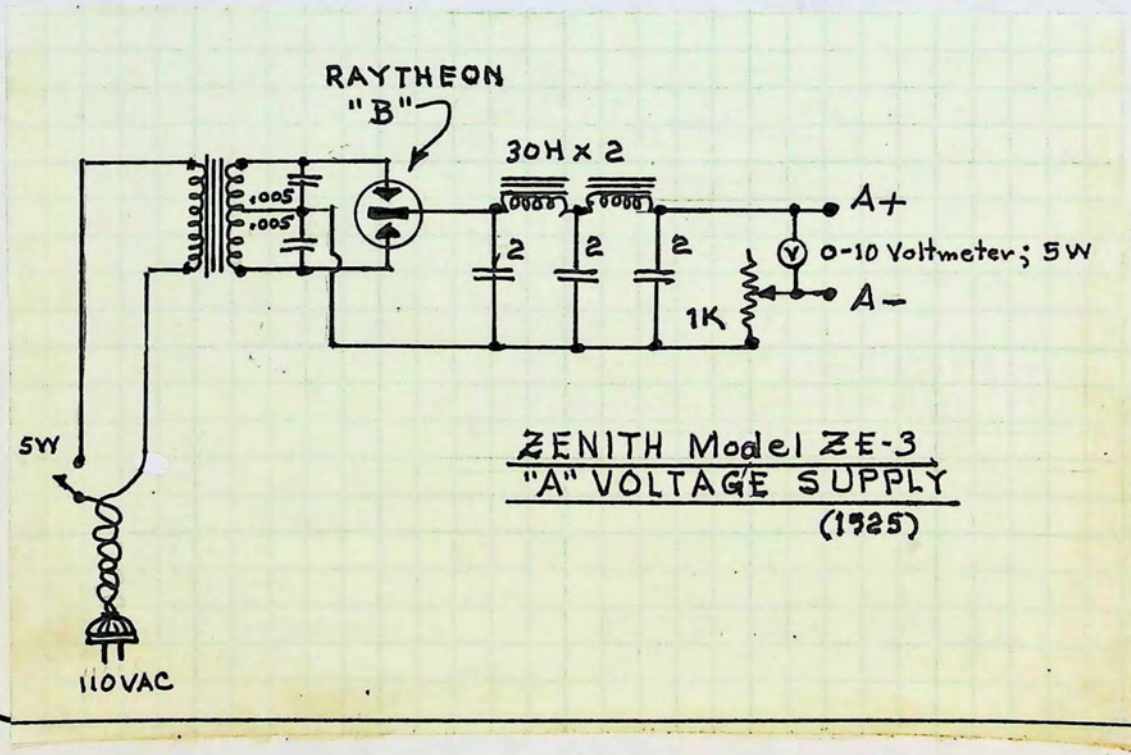
ACMEDYNE CIRCUIT



Vario-transformers Used in the

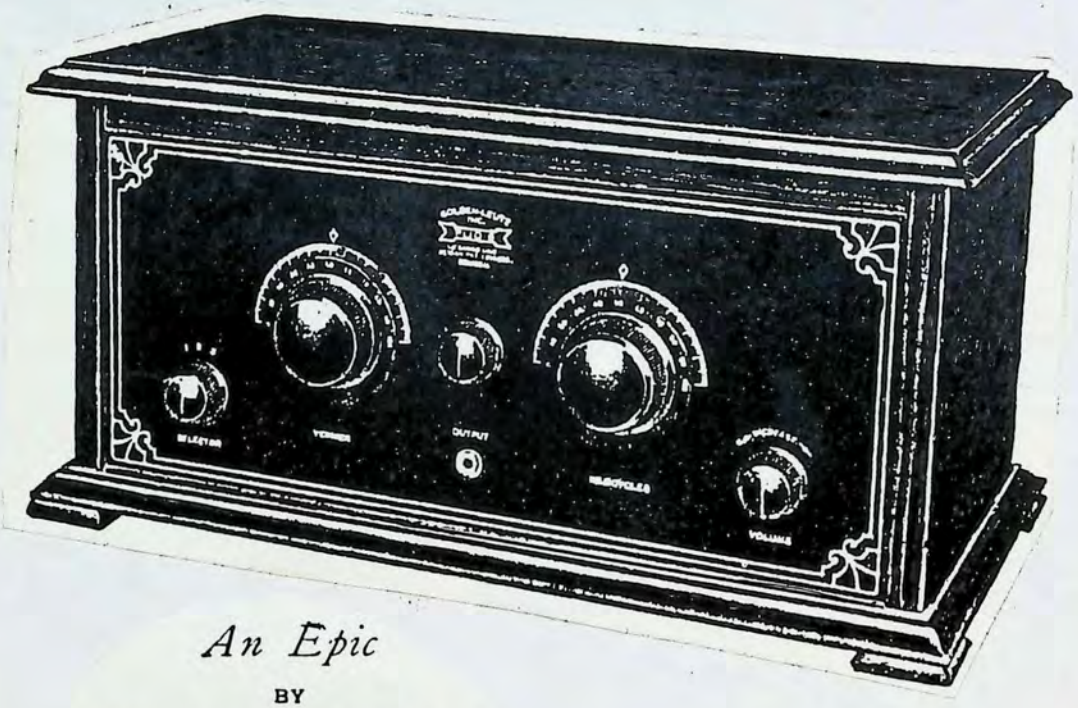
ACMEDYNE

TELOS



ZENITH Model ZE-3
"A" VOLTAGE SUPPLY
(1925)

UNIVERSAL PLIO-6



An Epic

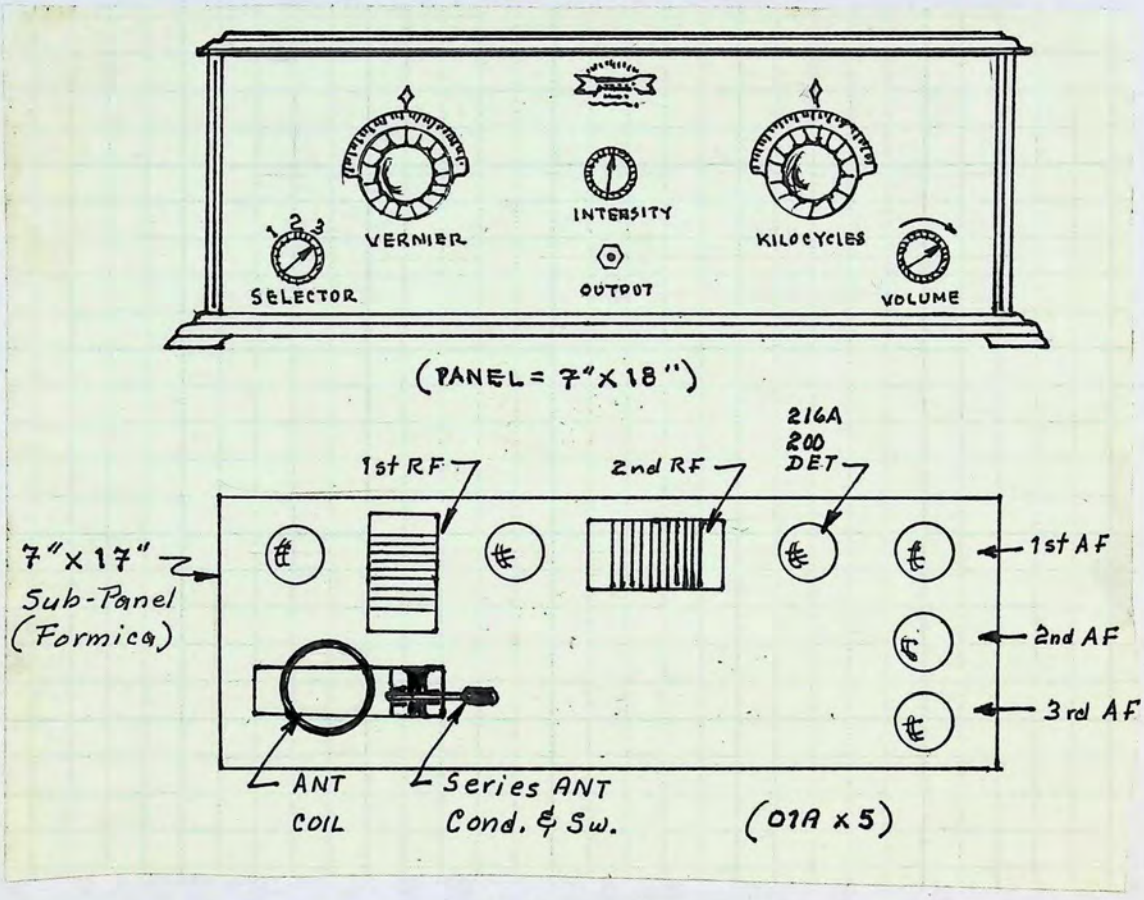
BY

CHARLES R. LEUTZ

While there may be those who would question whether or not Leutz's PLIO-9 was actually an "epic", no one will deny that the PLIODYNE circuit, covered by the Hogan patent, was a very popular circuit for home-constructors of the Twenties. As a more or less conventional T.R.F., it was easy to construct and produced excellent results, both in DX and tone-quality. If you have the original sets of Leutz coils, the rest is easy. The 1927 version, shown above, differed from the original 1926 version in that it incorporated the odd variable resistance in the grid lead, which was to become a standard feature on subsequent Leutz receivers. The range was also increased from 2800 meters to 3600 meters in the 1927 version.

(Sht. 1)

LEUTZ "PLIO-6" RECEIVER, 1927;Sht. 2

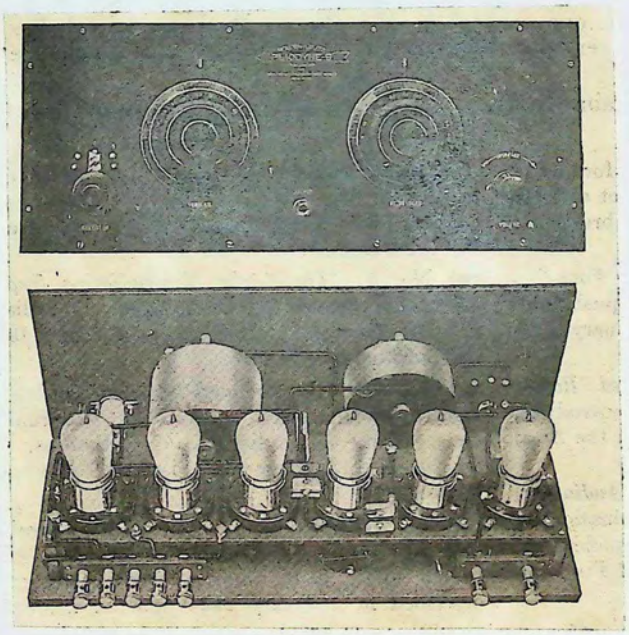


A single wire ANT was used for 35 to 500 meters from 100' to 250' long; for tuning over 550 meters, a wire of 1,000' was employed.
Ce-Co tubes were recommended by Leutz.

COIL RANGES; 3 COILS PER SET:

"A" - 200 - 550 Meters.
"B" - 80 - 210 Meters.
"C" - 35 - 90 Meters.
"AA" - 500 - 1500 Meters.
"BB" - 1200 - 3600 Meters.

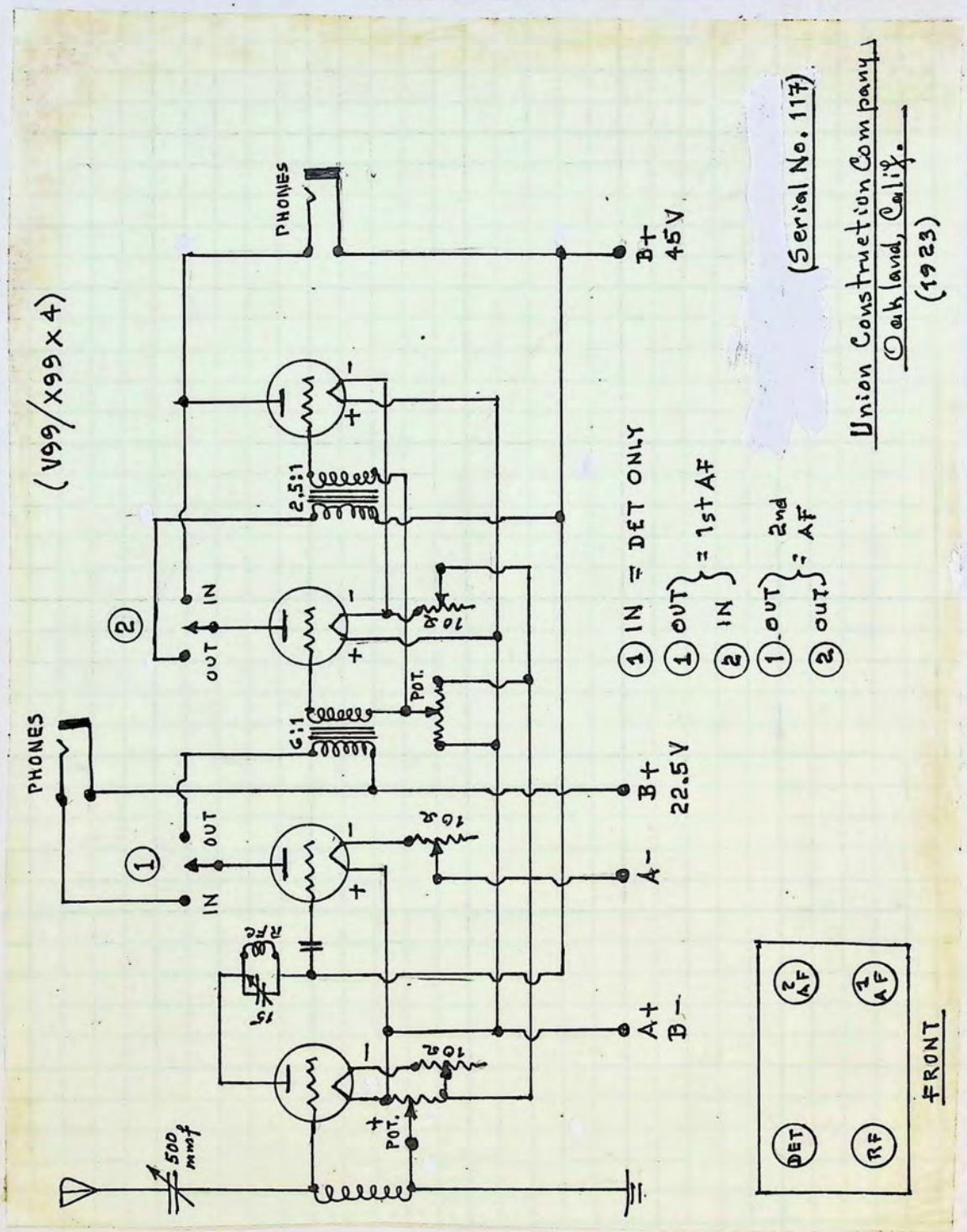
GOLDEN-LEUTZ
PLIODYNE-6
TRADE MARK REG.
"The Perfect Broadcast Receiver"



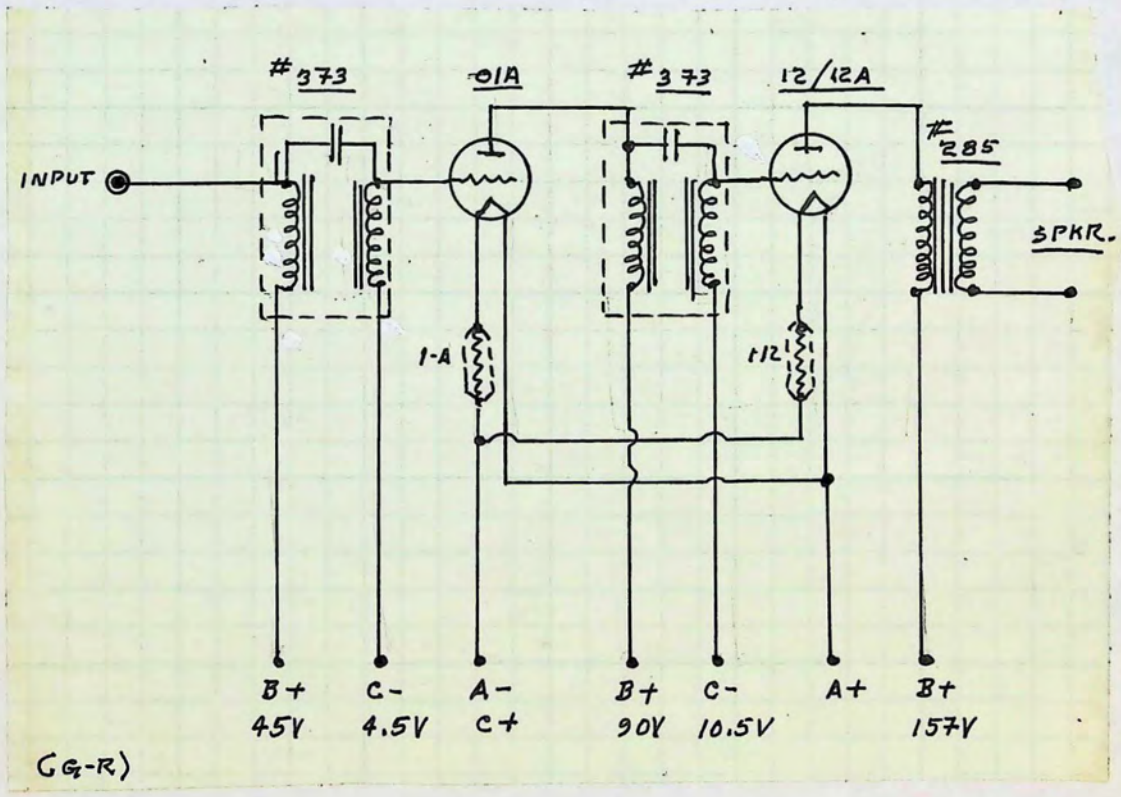
(PR

($60)

MASTER RECEIVER, MODEL 500, 1922

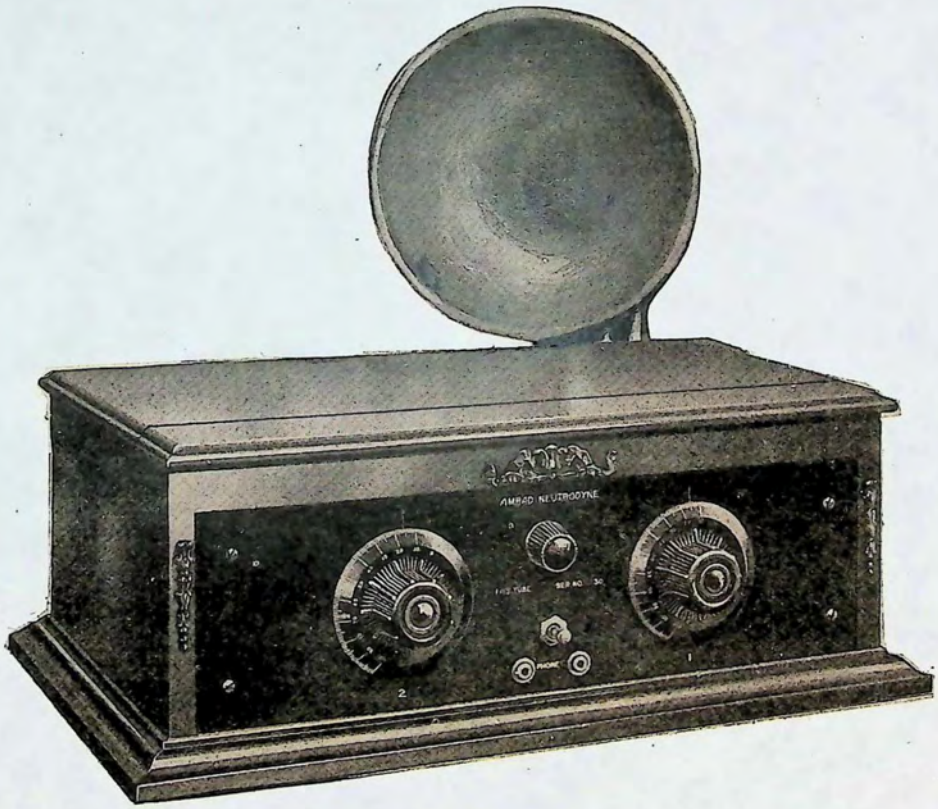


GENERAL RADIO AUDIO AMPLIFIER, 1924

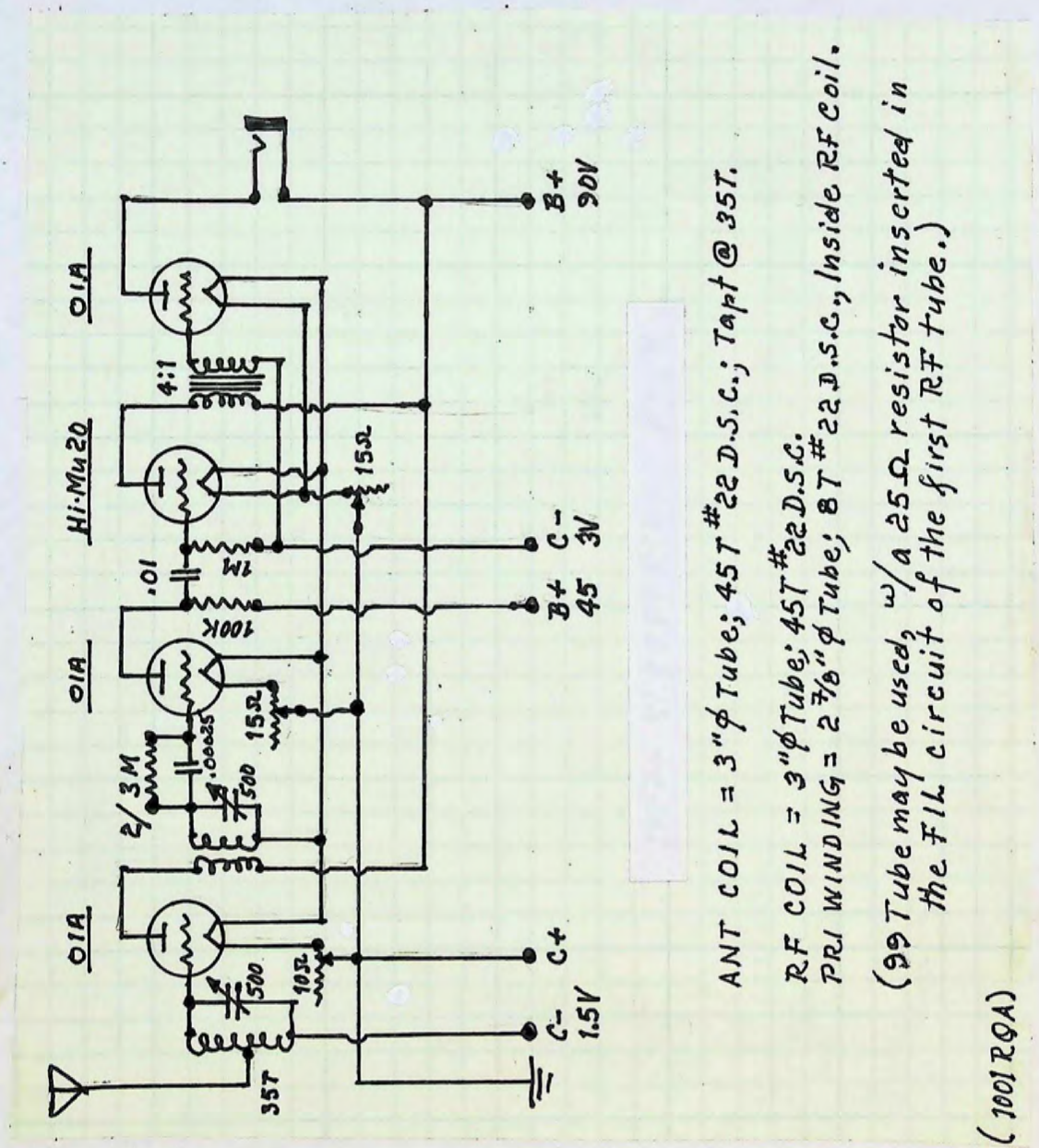


AMRAD
1923
Neutrodyne

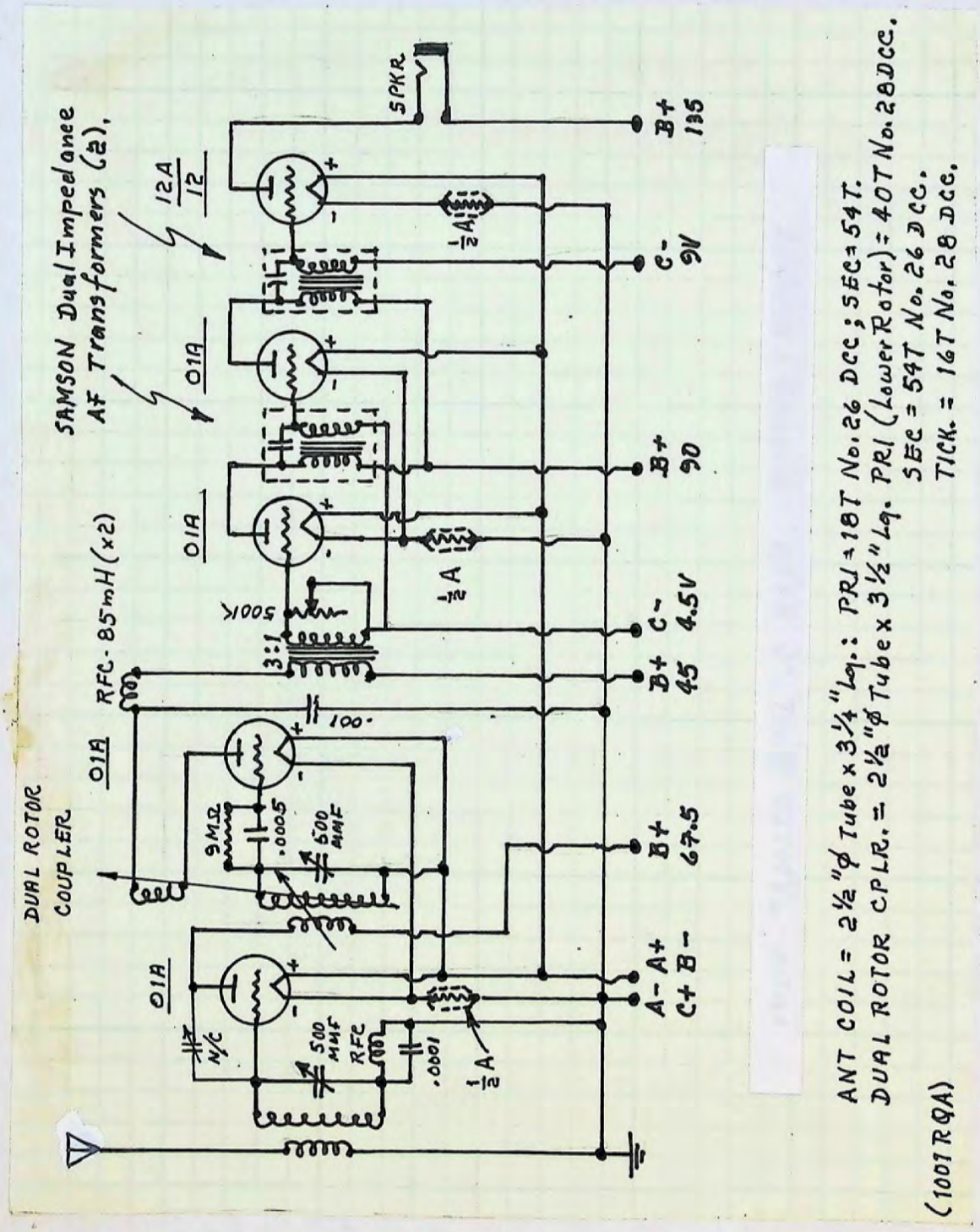
AMRAD NEUTRODYNE OF 1923



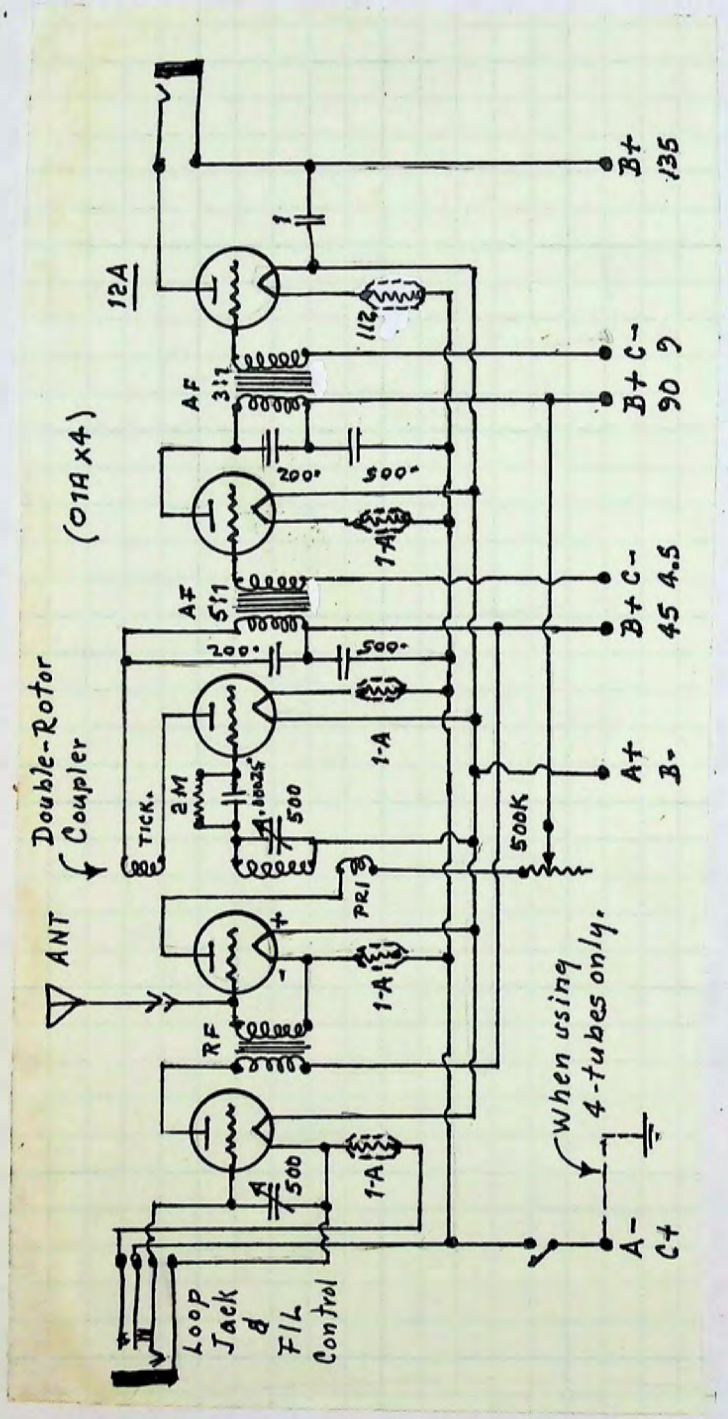
SLEEPER MODEL RX-1 RECEIVER, 1927



SAMSON DUAL T.C. RECEIVER; FACTORY MODEL; 1927



MULTIPLEX TRF RECEIVER, 1925

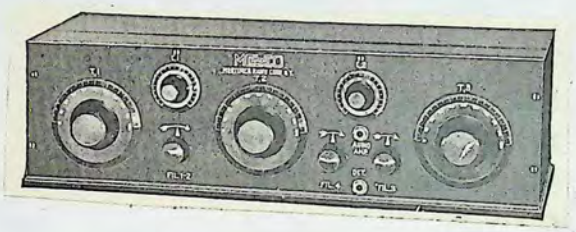


An Interesting Circuit.

Panel = 7" x 21".
Baseb'd. = 7" x 20".
(2) Vernier Dials 4" Ø.
Can be adapted to X-99 tubes by changing Amperites.
Removing LOOP plug cuts out the first RF tube.

(1001)

MELCO-SUPREME

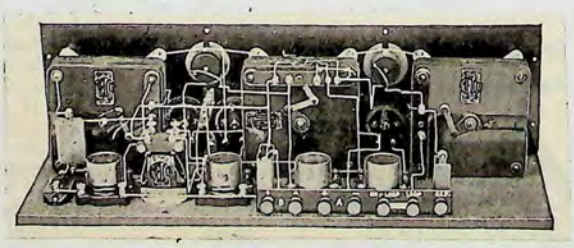


The set shown was AMSCO's first complete offering in 1922, and retailing for $125. Awhile later they offered the kitted version for $60, known as a "Knock-Down" version.

While it was a conventional circuit of the time, its claim to fame lay in the ACMEDYNE Circuit; actually, it rested with the overly sophisticated TELOS "Vario-Transformers", which were a combination of a variable condenser and variometer. Front and rear views are shown overleaf. Cockaday wrote enthusiastically about the TELOS units, but I note that he never incorporated them in any of his circuits.

The connexion to the TELOS units was unorthodox, and enhanced the chance of the home-constructor who had the kitted version, making a wrong one. The idea was better exploited in the dual rotor units manufactured by such as Peerless, Coto, Signal during the same year, which permitted the home-constuctor to do away with seperate variable condensers, variometers, and vario-couplers. The units made by Peerless and Lemco of San Francisco were undoubtedly the best of their kind.

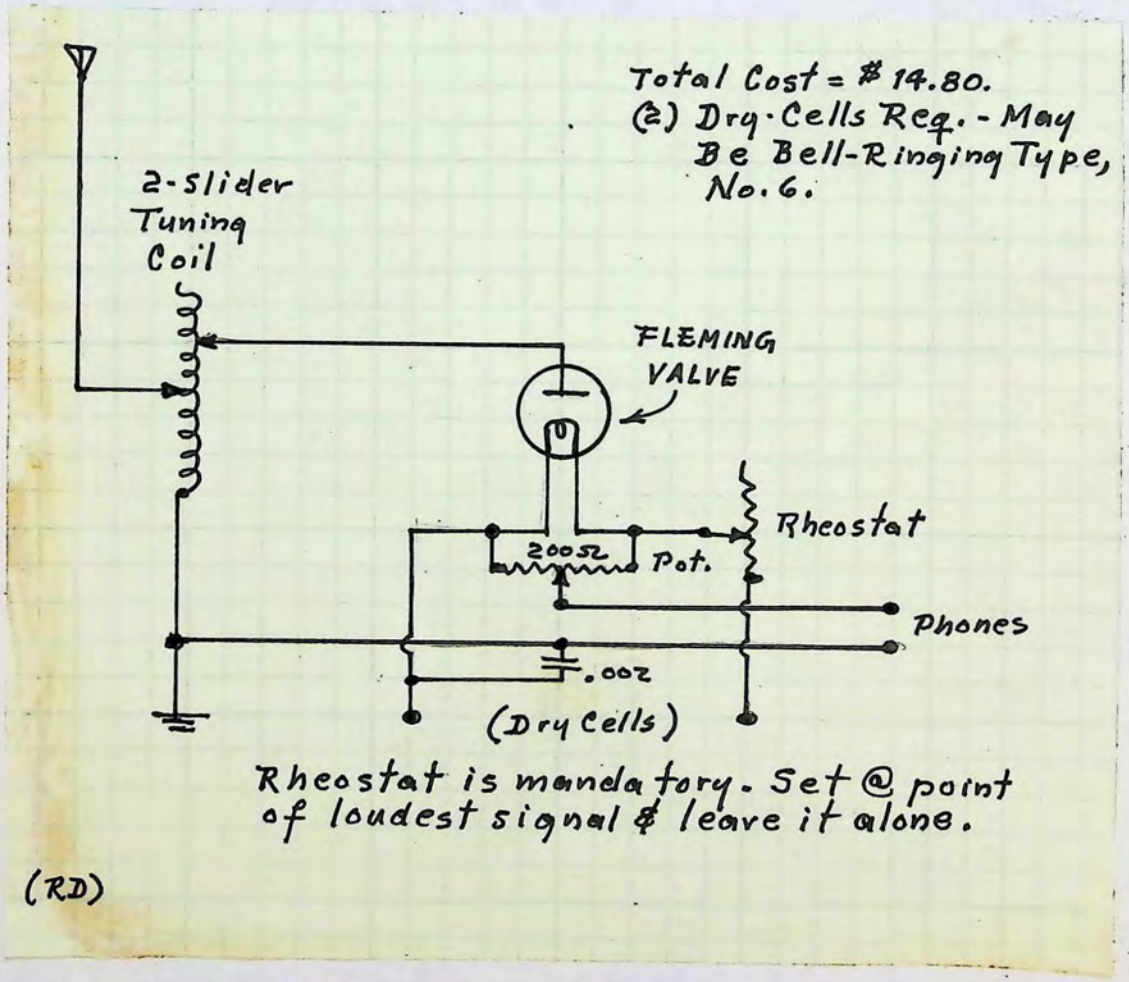
However, if you have three of the TELOS units, try your hand at AMSCO's first offering; it will be an experience worth your while. The other components were off-the-shelf items and are no problem.



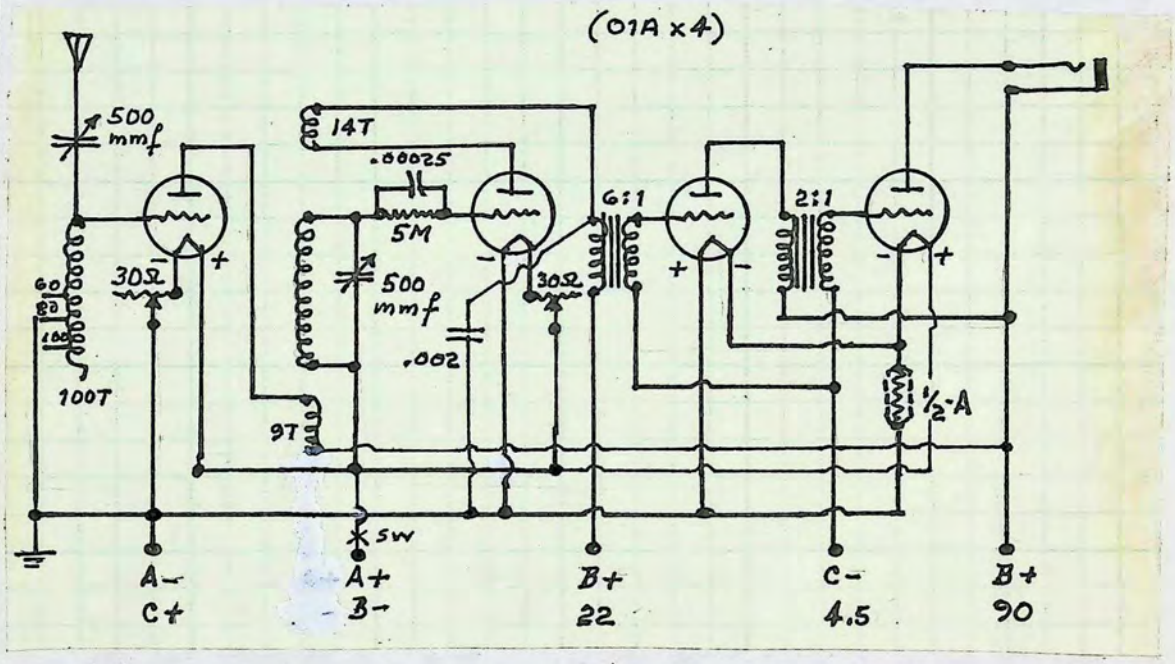
A FLEMING VALVE RECEIVER, 1922

The FLEMING valve (tube) preceded the "Audion" (triode) but was relatively useless for practical radio work. However, I have received several requests from readers of these Sketch-Books who have a Fleming valve, and cannot find relative data anent utilising it. For their edification, and perhaps yours, I append below a practical cricuit employing the Fleming valve. It works as well as any good crystal set, and the longer the antenna, the better the volume. It also kills a lot of "hash" inherent in a crystal set. Construction is simple and reception within a 50 mile radius will impress you.

* * *



ARKAY 4-TUBE TRF, 1924

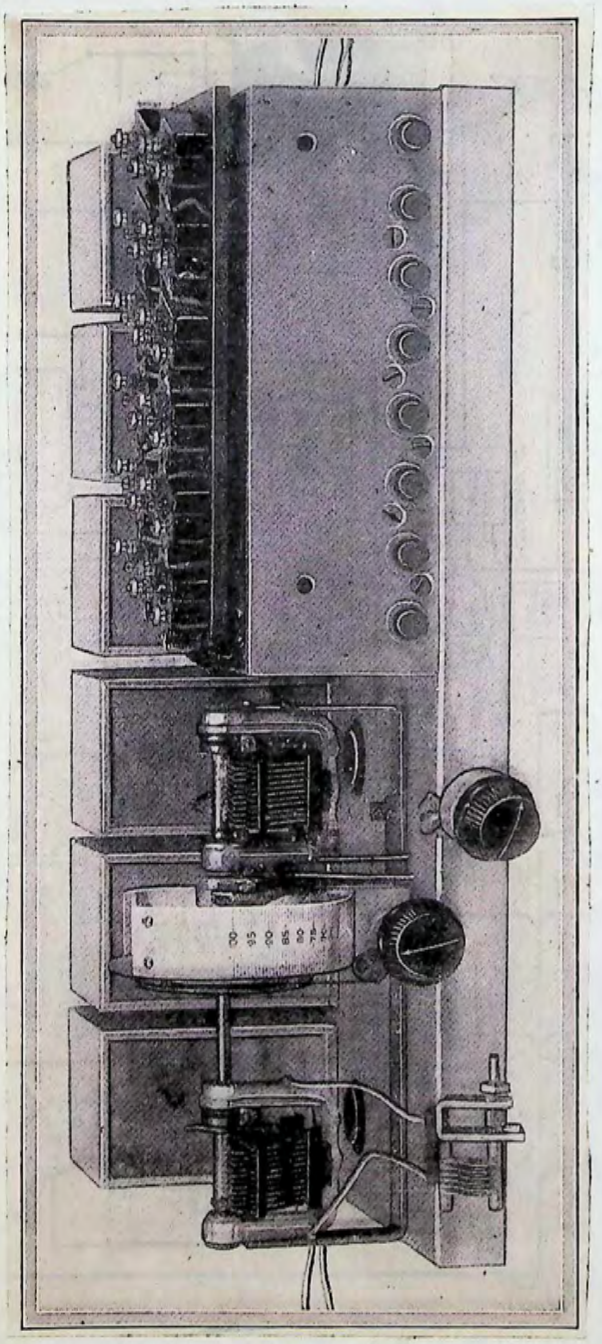


This receiver was designed by the Radio Editor of the Newark "Sunday Call". It is easily constructed and rather efficient.

Panel = 7" x 14"
4" Ø Dials
(5) Binding Posts

COIL DATA: Forms = 2½" Ø x 5" & 3" Ø x 3½".
ANT Coil: 100T, No. 22 DCC, tapt as shown.
SEC Coil: 14T, No. 24 DCC.
45T, No. 24 DCC wound in opposite direction.
9T, No. 24 DCC, wound in same direction.
Spacing between windings = ¼".

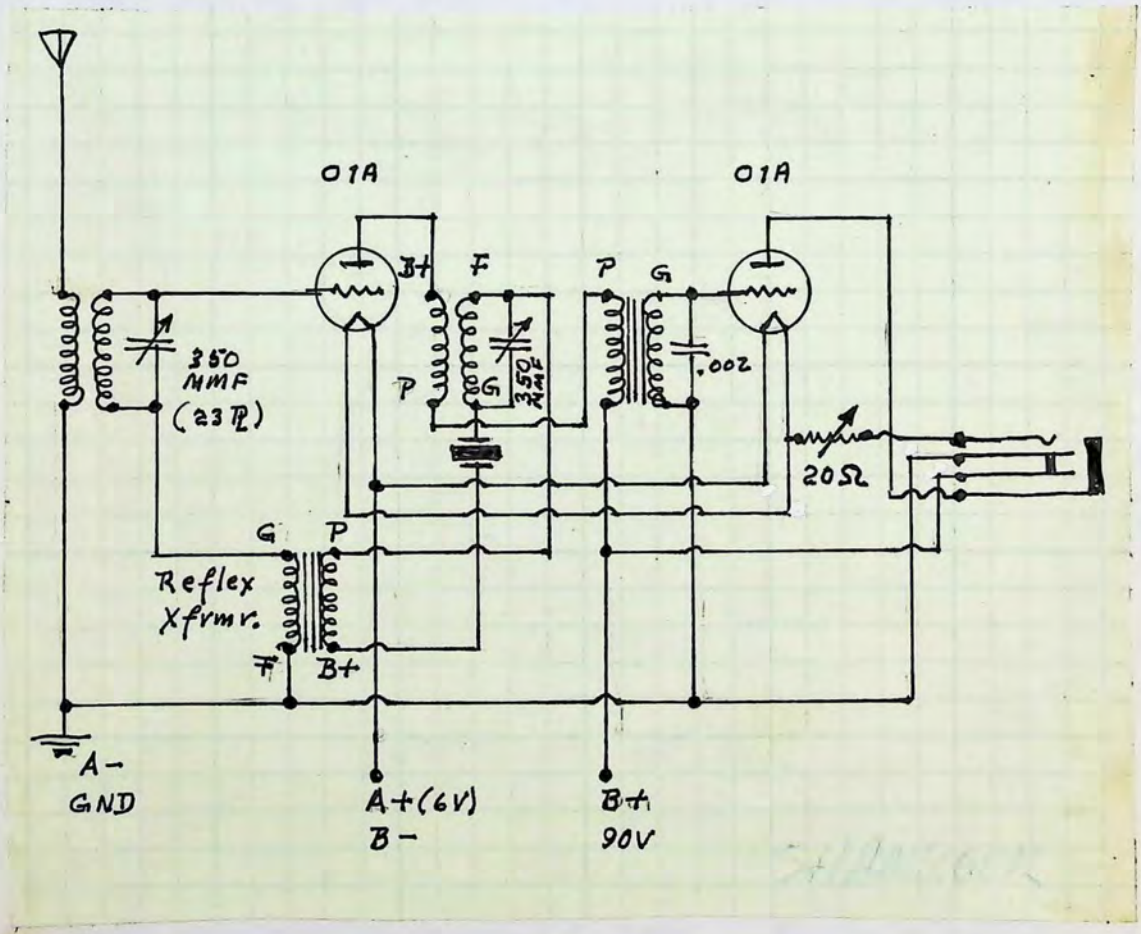
(1001)



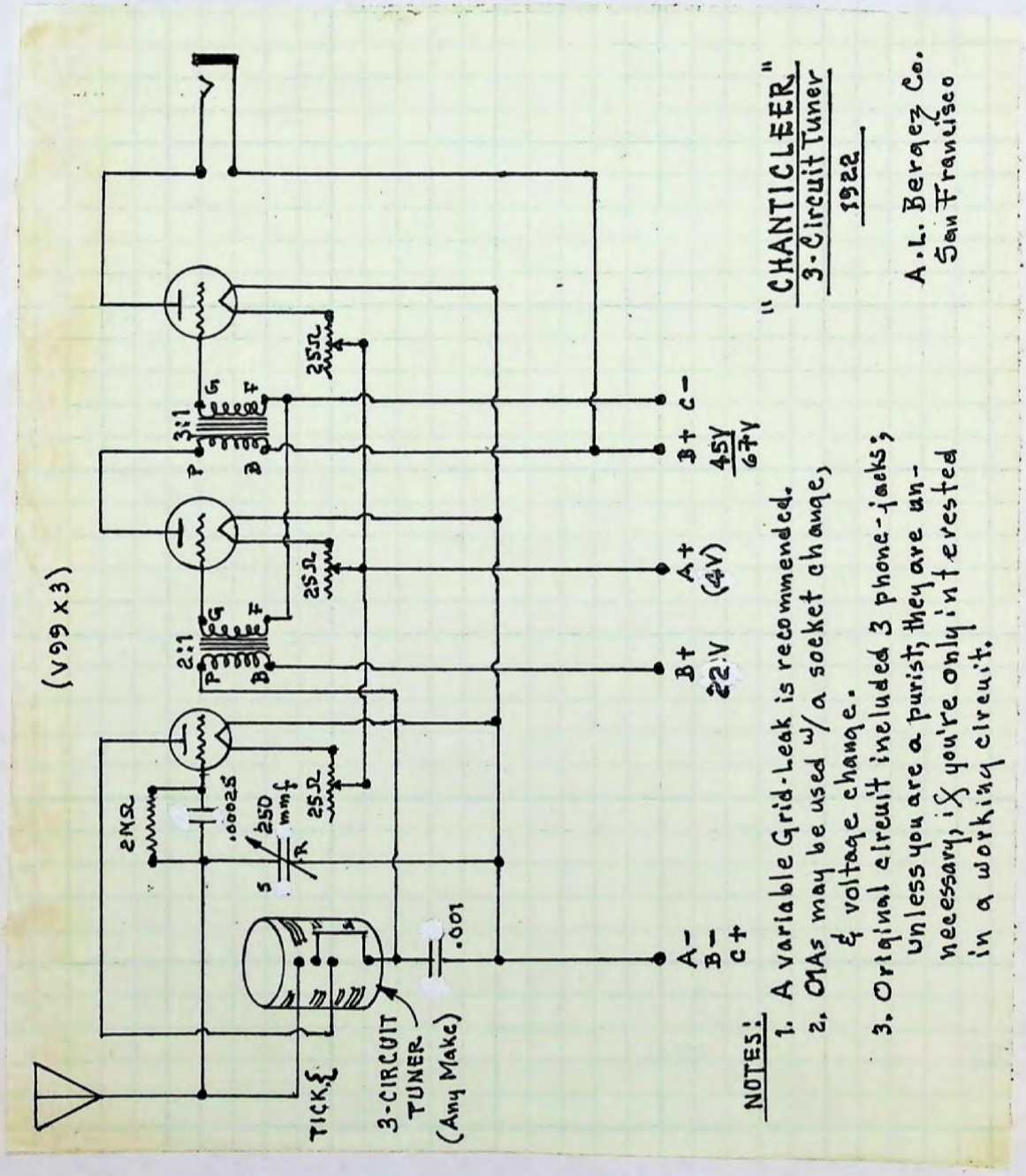
The cut on the preceding page shows the original Robertson-Davis "Super-Six"; the cut above shows the "Automatic Super-Six". The original "Super-Six" evolved from the "Melo-Heald" series of sets offered earlier, much modified and reflecting practically all advances in the state-of-the-art from the time of the last "Melo-Heald".

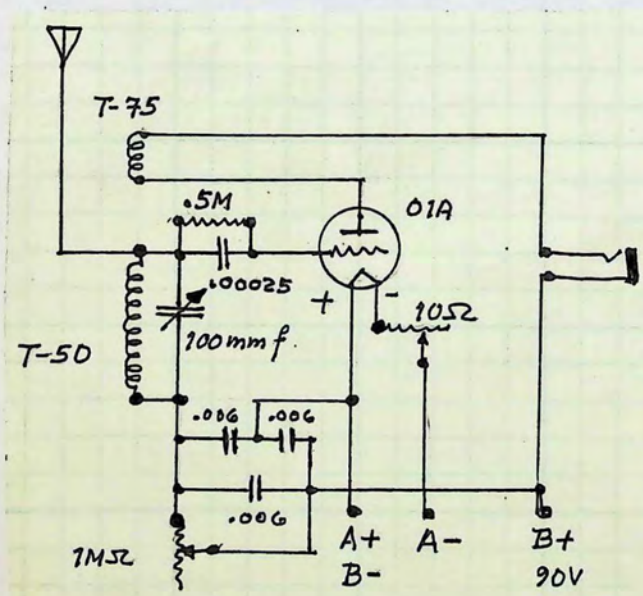
SHAMROCK REFLEX 2-TUBE SET, 1926

For the half-dozen years the SHAMROCK marque was around, they offered a few conventional circuits to the home-constructor with an emphasis on the reflex. They also manufactured their own coils, rheostats, potentiometers, but not variable condensers. The products were well-constructed - not as good as some; better than others. All were emblazoned with a gold-tinted shamrock decalcomania, instantly recognised. When MARTI, also of Newark, bought-out Shamrock in 1931, they dropt the marque, although they utilised a couple of SHAMROCK's circuits. While there is bothing out-standing about any of the SHAMROCK circuits, if you have SHAMROCK parts, there will be a satisfaction in constructing one of their circuits.



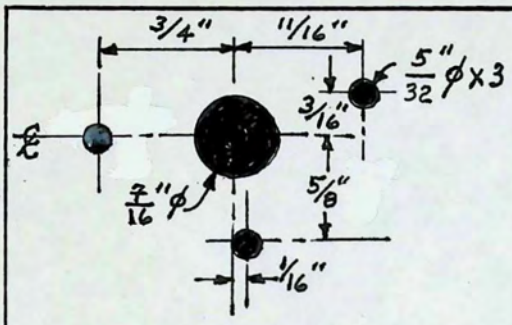
"CHANTICLEER" 3-CIRCUIT TUNER, 1922





Honeycomb-coils shown; T-50 may be wound on 3"ϕ form w/ 65T #22 DCC; T-75 may be wound on another 3"ϕ form w/ 90T, #22 DCC wire.

FLEWELLING SUPER-REGENERATIVE, 1925



STD. B-T VARIABLE COND.
MOUNTING HOLES TEMPLATE

THE MODULE MYSTIQUE

In the plethora of "buzz-words" (which seems to be the only modern mode of communication) thrown up by the attempt of the uneducated to make of "electronics" something seperate and special, one will always stumble over the word "Module". We have modular assembly in computers, video cameras, electronic flash-units, and the latest stupidity, the modular dictates of voices emanating from within your piece of modern Detroit Iron - to use an old hot-rodding term.

However, like everything else in electronics, the word is derivative of another time, another discipline. You may recall that the first PC board was manufactured in 1924 by the Duraplate Company of Philadelphia. (It was a failure.) The modular concept was very much alive in the Twenties, and actually evolved from the earlier concept of individual units joined together - i.e., detector unit, RF amplifier unit, AF unit as seperate boxes.

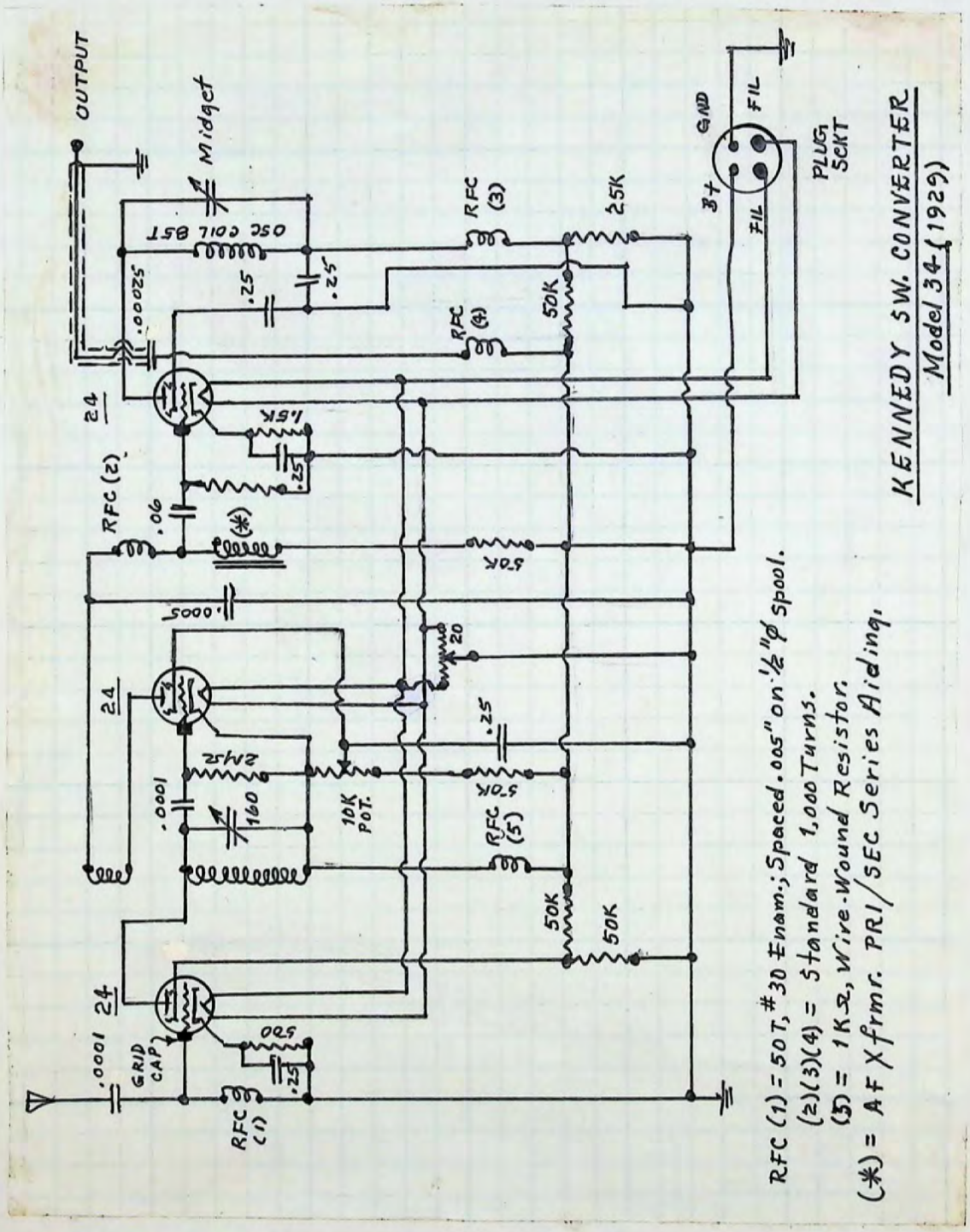
Modular receivers enjoyed a spate of popularity in the mid-Twenties, and by 1929, Geo. Walker, the Victoreen distributor, was still pushing the concept. Concurrently, firms such as Leutz, Norden-HAuck, General Instruments, S-M, were offering modular construction.

The idea of compartmentising RF stages was used early on, and became a fixed concept by 1930, giving way to the standardisation of coil shields and metal chassis, which more or less served the same function as modular construction. As far as I have been able to determine, the shielding of the RF stages began with Armstrong, although his shields were more like baffles than compartments.

Simply to make the point, and which you may find edifying as another reference in your accumulating knowledge of vintage radio, I append herewith a few examples of the so-called modular concept. As Soloman once observed, there is nothing new under the sun - all is vanity and vexation.

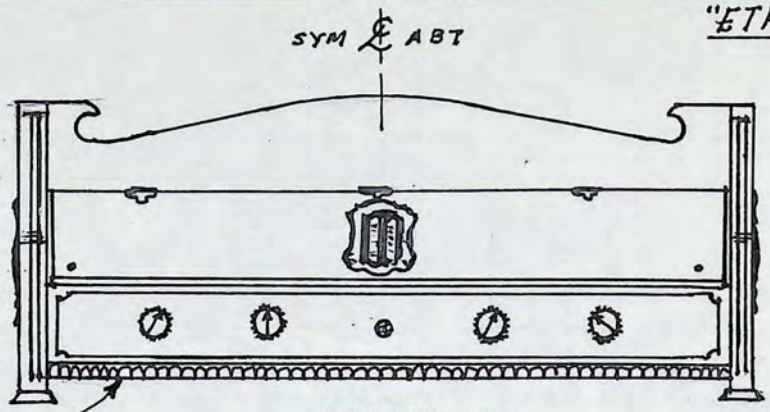
* * *
* *
*

KENNEDY SHORT-WAVE CONVERTER Model 34;'29

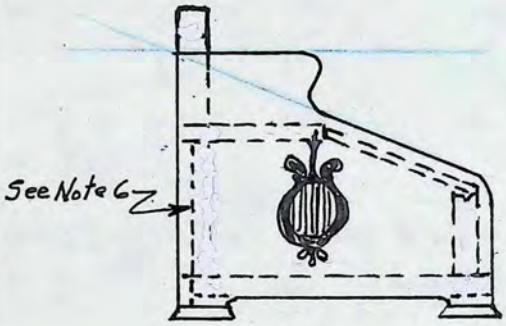


(Sht. 1)

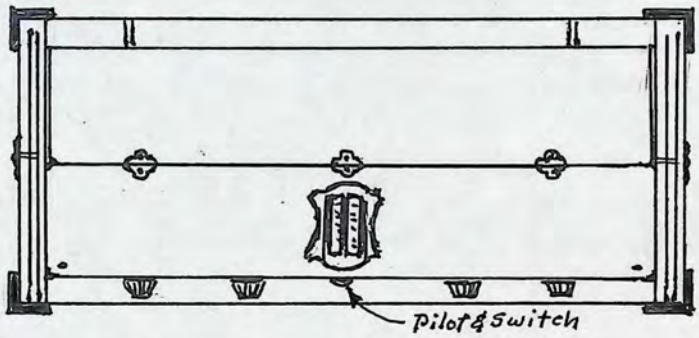
"ETHERWAY" CABINET
FOR ALDEN'S
TRUPHONIC
"Localized Rcvr."
(1926)



ELEVATION



PROFILE



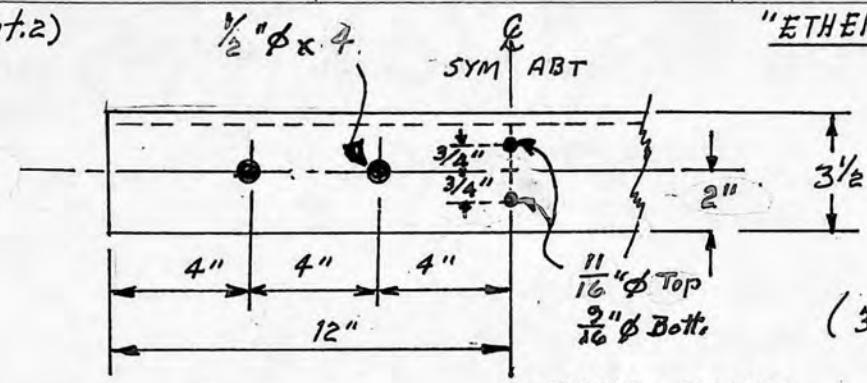
PLAN VIEW

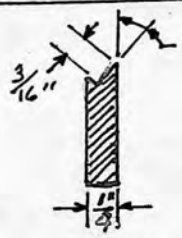
NOTES

1. All panels = $\frac{1}{2}$" solid Walnut, except hinged panel.
2. (3) Hinges = solid Brass, as shown.
3. Cabinet symetrical about ℄.
4. End pieces identical, opposite hand.
5. Hinged panel = $\frac{3}{16}$" Walnut, nominal.
6. Back panel = perforated 1/8" plywood or composition material.
7. Dial & knobs & escutcheons to be supplied by D.H.M.
8. End pieces to be grooved as shown.
9. Bottom scalloped moulding & end mouldings by D.H.M.
10. Controlling diminsion = hinged panel 6"x24", & knob panel 3½"x24".
11. Proportions approximately as depicted.
12. Finish, inside & out, no high gloss!
13. Break all sharp edges.

(sht.2)

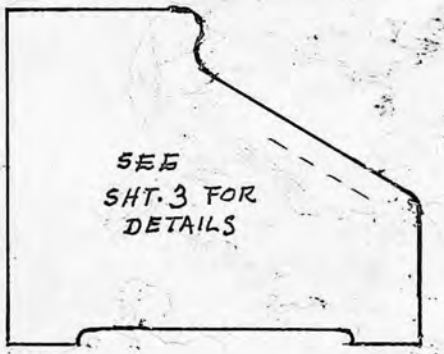
"ETHERWAY" CABINET



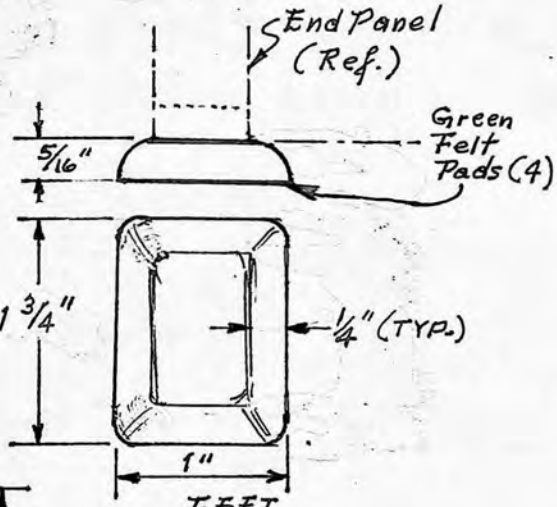


(3 1/2" x 24" x 1/4")

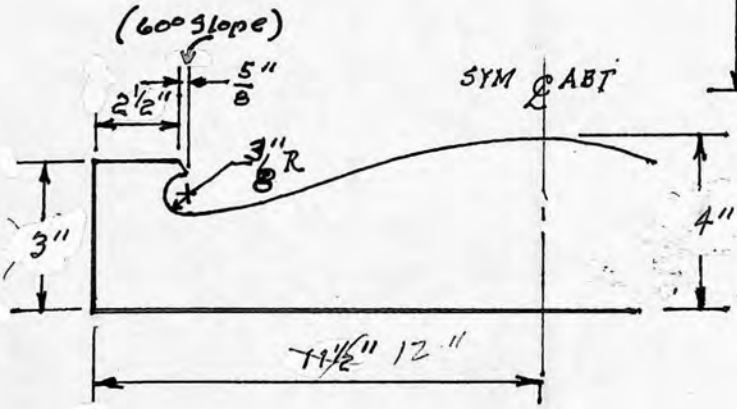
FRONT PANEL



END PANELS
(2 REQ.)



FEET
(4 REQ.)

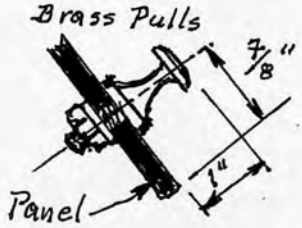


(All sizes approximate.)

VALANCE

(4" x 2 3/8" x 1/2" o/A)

BREAK ALL SHARP EDGES.
BASEBOARD = 10 1/8" x 23" x 1/2".

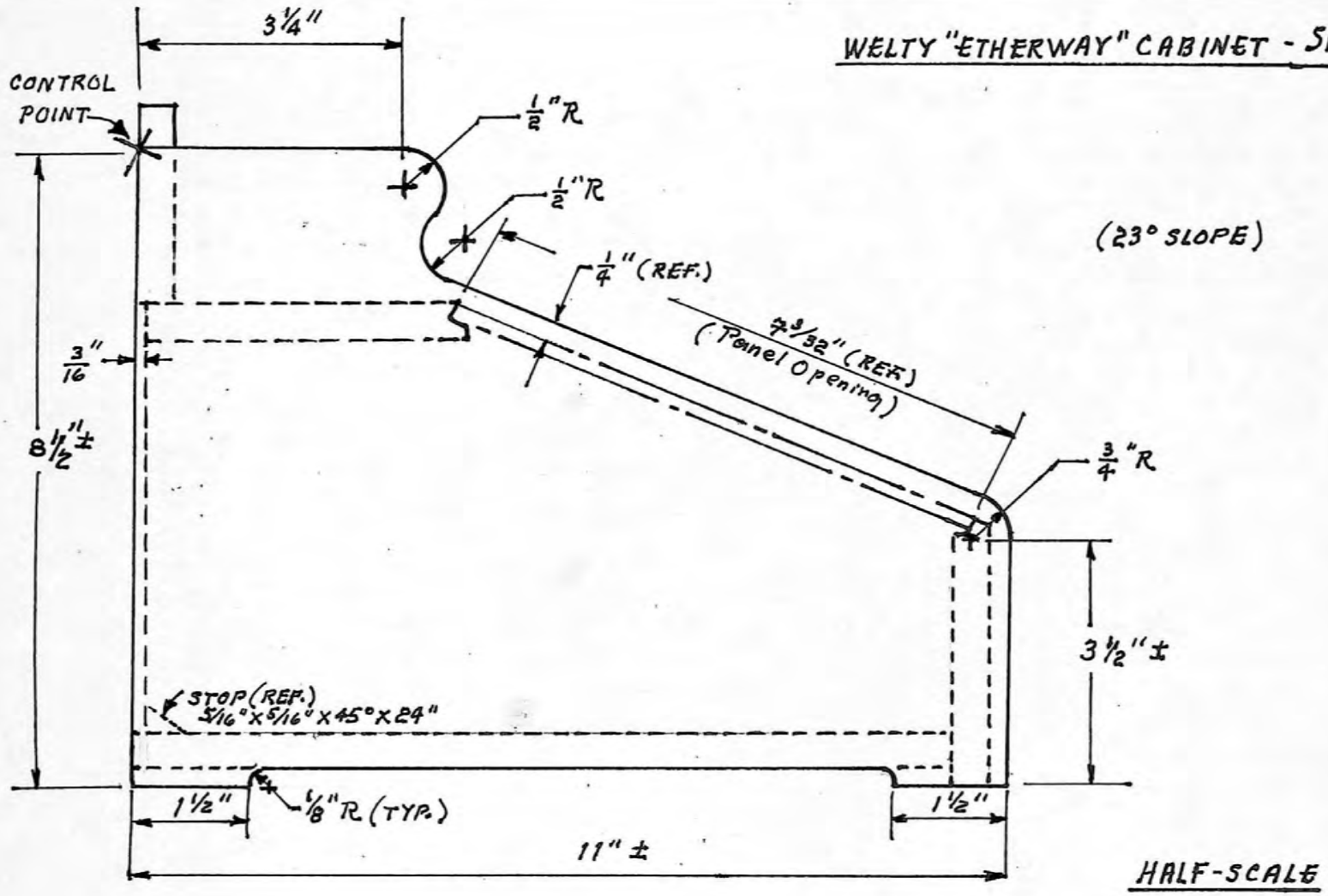


PANEL LIFTERS (2)

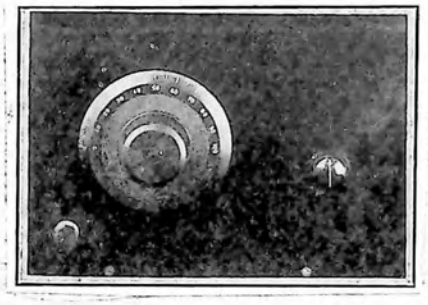
(NO SCALE)

NATIONAL 42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
Made in U.S.A.

WELTY "ETHERWAY" CABINET - Sht 3



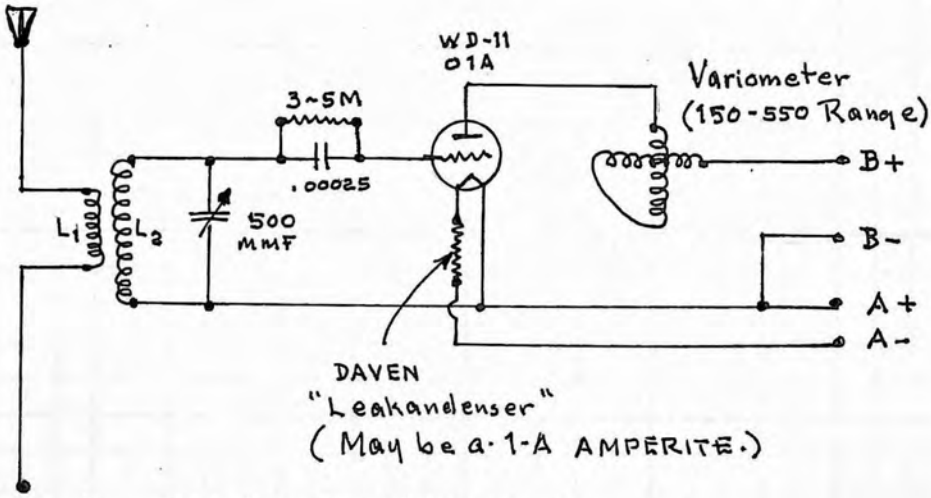
END PANELS - 2 REQ.
(1/2" WALNUT)



COIL DATA

L_1 = 12T, #24 DSC (PRI) 2"ø x 2".
L_2 = 85T, # 22DSC (SEC) 1¾"ø x 3".

PRI is slipt over SEC, located mid-way between FIL end & centre of SEC tube.

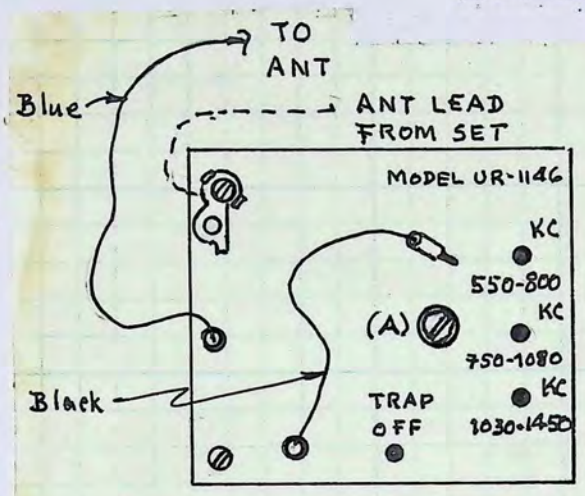


ANT Post
On Set

Baseboard = 6"x9" Wood.
Panel = 7"x 10" Hard Rubber.

(RW 12·26·'25)

RCA MODEL UR-1146 WAVE-TRAP, 1927



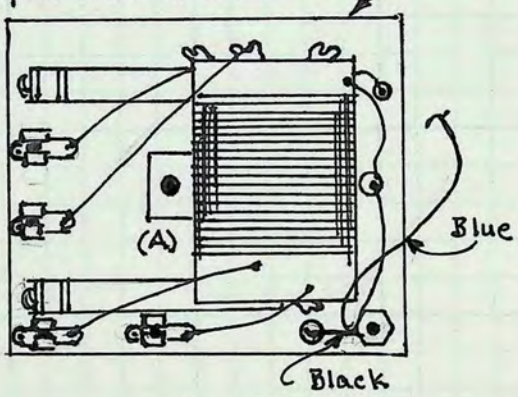
1450 ~ 550 KC.
(207 - 545 Meters)

INSTRUCTIONS

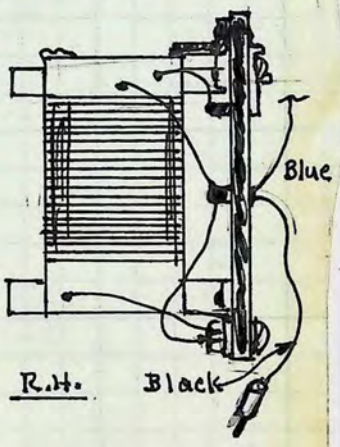
1. Tune in interfering signal.
2. Turn VOL control to max.
3. Turn VOL control to min.
4. De-tune to one-half VOL.
5. Insert pin-plug into range desired.
6. w/ insulated screw-driver, turn screw c.w. full, then c.c.w. to min.
7. No further adjustments.

(A) = Adjusting Screw

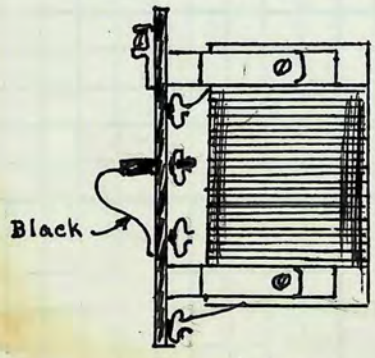
3 3/16" Square Black Bakelite



REAR VIEW



R.H.



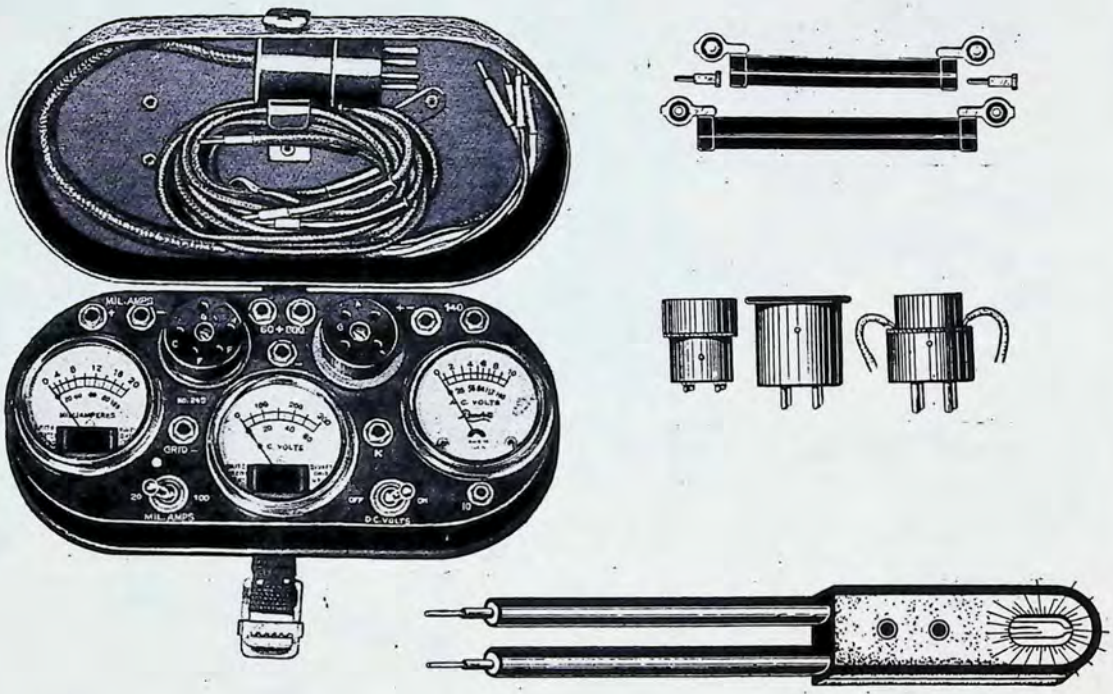
L.H.

NOTE: This wave-trap was originally designed to be used w/ the RADIOLA 33. It will work w/ any set.

To by-pass wave-trap, insert pin-plug in hole marked TRAP OFF

(RCA)

READRITE "JIFFY" TESTER; Sheet 1



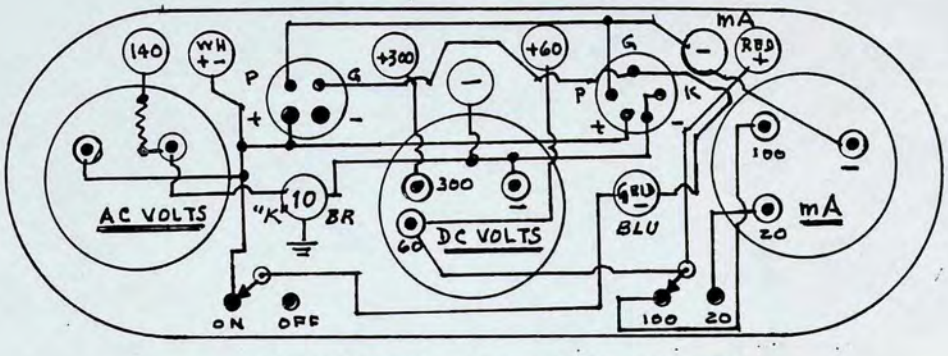
The READRITE tester shown above was known variously as the Jiffy Tester, the J-245, the J-245-X, and the JT-5, from 1927 until 1931. Very minor changes were made during its life, but the basic design concept remained the same.

Of all the miniature set testers, analyzers, tube testers termed portable, the Jiffy tester was probably the neatest and most compact. It was also reliable and held its own against the larger or better known set-testers. A few are still to be found at flea-circuses and you should have a go at revitalising one, and using it.

The case included two voltage multipliers, tube socket adapters, a screen-grid cable with plug, a neon-lamp indicator, test leads, and, originally, a crinkle-finish steel carrying case. Later, the case was chromium plated. It began selling for $15; by 1930 mail-order houses in New York were offering it for $3.78.

All original wiring was #14 "Celastite", by Acme, and you will find the insulation cracked and the wire stiff. Simply re-wire.

READRITE "JIFFY" TESTER; Sheet 2



BOTTOM VIEW, BASE PLATE REMOVED

NOTES:

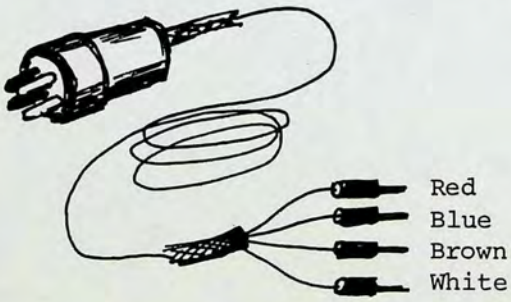
1. The resistance shown was actually a large, flat wire-wound resistor, 4" long and 1½" wide, wrapt in asbestos. It can be replaced by a modern ceramic power resistor. Original resistance was 1.307 ohms, which could be challenged.

2. On some models the ON-OFF switch was labelled either GRID or DC VOLTS. The GRID label was used with the tester that employed the 3-terminal DC Voltmeter.

3. Some models substituted "K" for "10"BR.

4. All models used a dual-scale on the DC voltmeter, but some models, as shown, used a 3-terminal meter.

* * *



EXTENSION CABLE

You can make-up this cable yourself.

Tips were plugged into the corresponding coloured jack for circuit testing. Tube from set was placed in the appropriate socket of the tester, and the plug inserted into the tube socket of the set. (See the following pages for complete instructions.)

With the ON-OFF switch placed at OFF, the set will function normally.

(Sht.2)

OPERATING INSTRUCTIONS

WORKRITE MODEL J-245-X JIFFY TESTER

TO MEASURE FIL VOLTAGE, AC OR DC: Connect 4-lead cable terminals to tester, colour for colour. Place GRID switch at OFF. Plug tube into tester. Plug 4-lead cable into socket of removed tube. Read FIL voltage on 0-10 scale of AC voltmeter.

TO MEASURE PLATE CURRENT: Proceed as in Test 1. Set mA switch at 100. Read corresponding scale. If current is less than 20 mA, throw switch to 20, and read upper scale of mA meter.

TOTAL PLATE CURRENT OF RECEIVER: Use mA meter as a separate meter. Open B- lead to receiver. Set mA switch at 100. Connect opened B- leads to (-) and red jacks marked MILLIAMPS. If needle goes backward, reverse leads. Use red and black leads to make the connexion. If current is less than 20 mA, throw switch to 20.

PLATE VOLTAGE APPLIED TO ANY TUBE IN SET: Proceed as in Test 1. Read voltage on 0-300 scale.

TESTING TUBE CONDITION: Proceed as in Test 2. Note plate current. Throw GRID switch ON and again note plate current. Second reading should be considerably higher than the first - about twice.

MEASURING FIL EMISSION: Proceed as in Test 2. Leave GRID switch at OFF. With one lead, connect GRID and PLATE by plugging in (-mA) and Blue jack. Short out any plate resistor or AF xfrmr.

TO MEASURE AC LINE VOLTAGE: Tap the AC line at a convenient point, being careful not to affect a short. Bring one side of the line to jack marked 140; the other to jack marked White. Read line voltage on 0-140 AC volts scale.

CONTINUITY OR OPEN TESTS: Apply Tests 1,2,3,4. If these tests check-out properly, all circuits are okay. If no indications shows up on any test, something is open. To locate, use the DC voltmeter and an external 7½V battery. Plug black lead into (-) jack in centre of tester, and red lead into +60 jack. Connect red lead's other end to (+) side of external battery; black to (-). Use black lead for exploring the suspected circuit. If an open is found, no indication will occur on the meter.

SHORTS IN COMPONENTS TEST: Prodeec as in Test 8. Remove the part, if feasible, from the set. Connect the exploring leads to the part and note voltage reading. If component is good, there will be no reading for condensers; for resistors, full scale reading

WORKRITE MODEL J-245-X JIFFY TESTER OPERATING INSTRUCTIONS (Sht. 3)

should be obtained, and also an open coil.

TO DETERMINE GRID BIAS OF A TUBE: Use the DC voltmeter seperately. Plug red and black leads into (-) and +60 jacks. Connect other end of red lead to FIL or CATHODE (K) in the set, and the black end to the GRID or F- terminal of the coupling transformer ahead of the tube, or to the corresponding point on the grid-leak.

TEST FOR OVER-LOAD & DISTORTION: Proceed as for measuring plate current If mA meter remains stationary or fluctuates only slightly, on loud signals, tube is not over-loaded. If it jumps around wildly tube is grossly over-loaded.

TO TEST FOR PROPER BIAS: Proceed as in Test 11, and note mA meter. If needle kicks upward on loud signals, bias is too high. If it kicks downward, bias is too low. If needle is stationary, bias is correct.

TO DETERMINE THE START & STOP OF OSCILLATION: Proceed as for obtaining plate current, plugging into oscillator tube. Start of oscillation is indicated by a sudden rise in plate current. Stopping of oscillation is indicated by a sudden drop in current.

TESTING SCREEN-GRID TUBES: Proceed as for other tubes, leaving the GRID switch at the OFF position. Connect one end of the Screen-Grid leads supplied with the unit to the control grid-cap, and the other end to the normal cap for the tube. Read plate current on mA meter. Control grid test may be made by removing the end of the lead at the set and touching it to the jack marked 10 (Brown). Plate current should increase.

MEASURING DC VOLTAGES: Use DC voltmeter seperately and connect one J-106 multiplier in series with one of the leads to the meter. Read the 0-300 scale, and multiply by 2. Measurements up to 600V may be made.

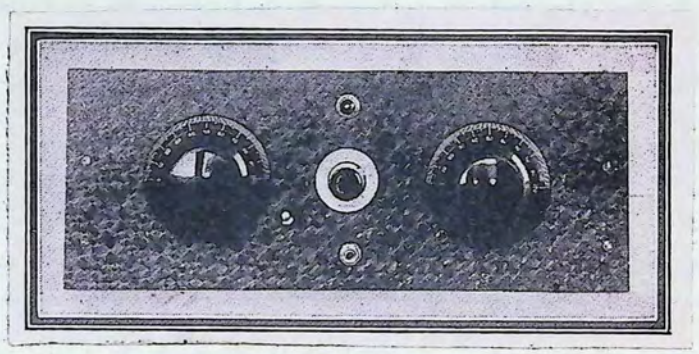
TO MEASURE UV99 TUBES: Use adapters J-19 or J-20, as required, and proceed as for other tubes.

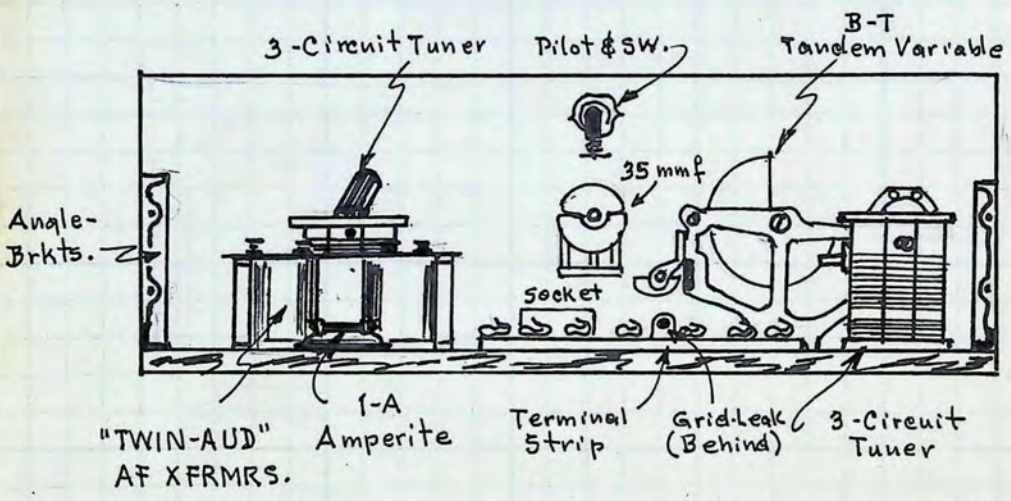
TO MEASURE KELLOGG OR OLDER ARCTURUS TUBES: Use adapter J-24 and connect red leads to heater clips. Proceed as with other tubes.

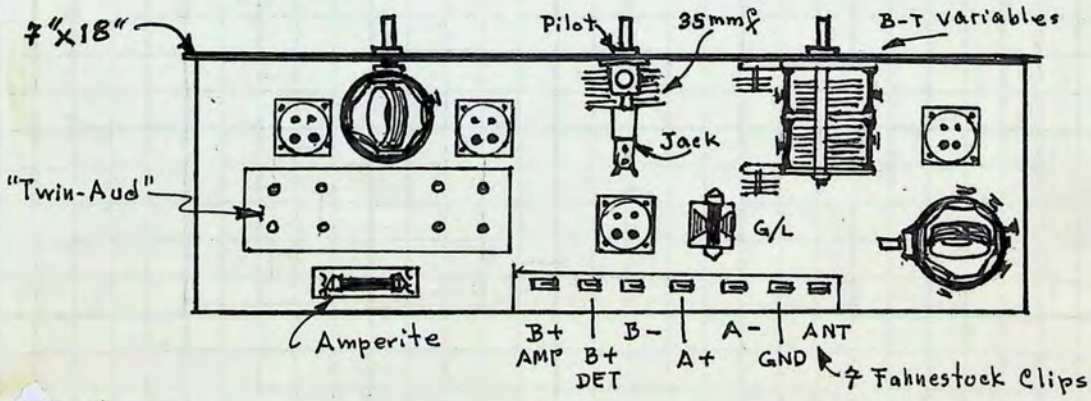
MEASURING SCREEN-GRID VOLTAGE: Use DC voltmeter seperately. Plug red lead into +300 jack; black lead into (-) jack. Connect other end of red lead to screen-grid (G on socket), and black lead to FIL or cathode. Read voltage. If less than 60, move red lead on tester to +60 jack and read lower scale.

* * *

BERNSLEY's "DYADYNE" DUAL-REGENERATIVE; Sht. 1







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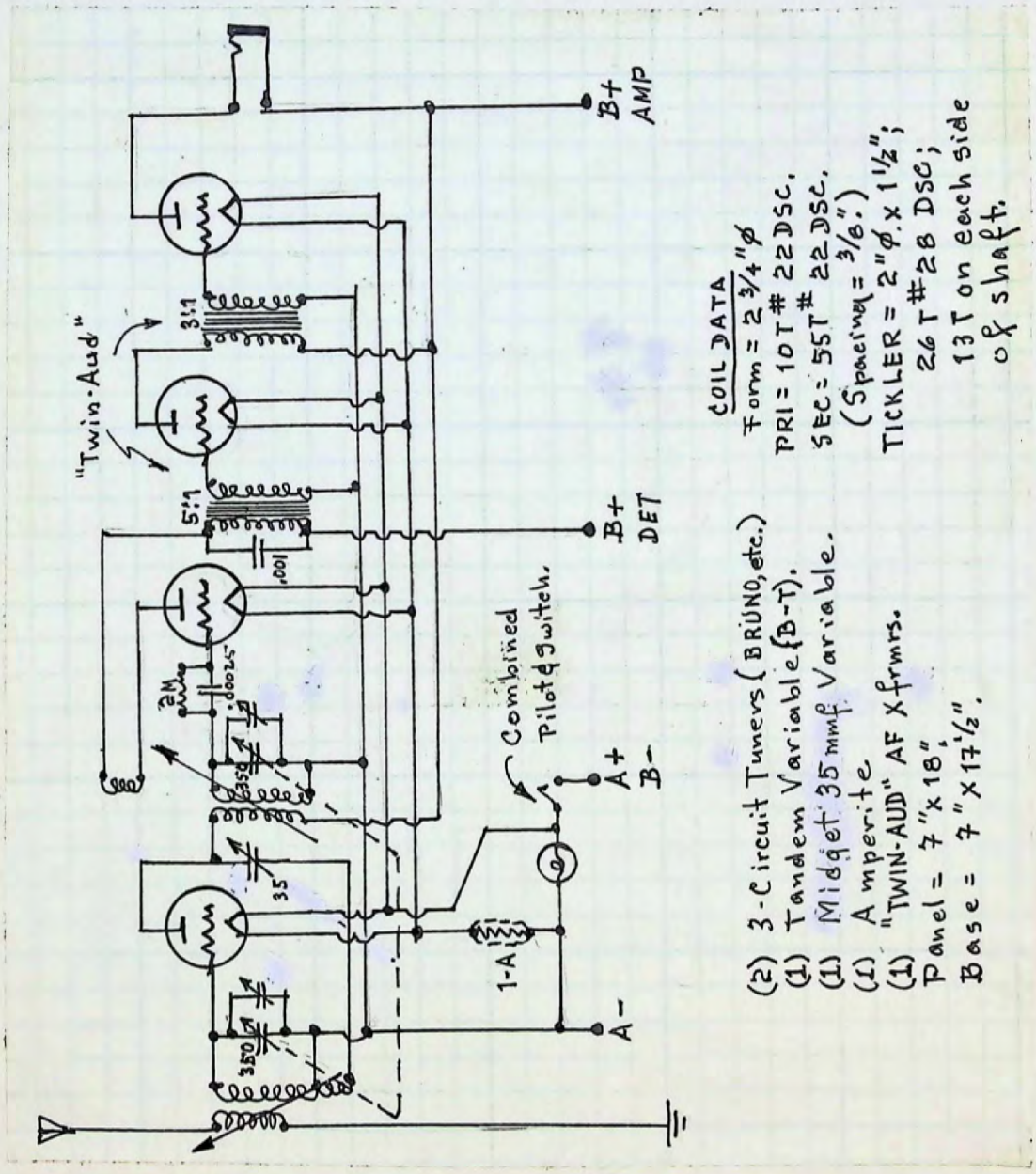
BERNSLEY's "DYADYNE" DUAL-REGENERATIVE; Sht. 2



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